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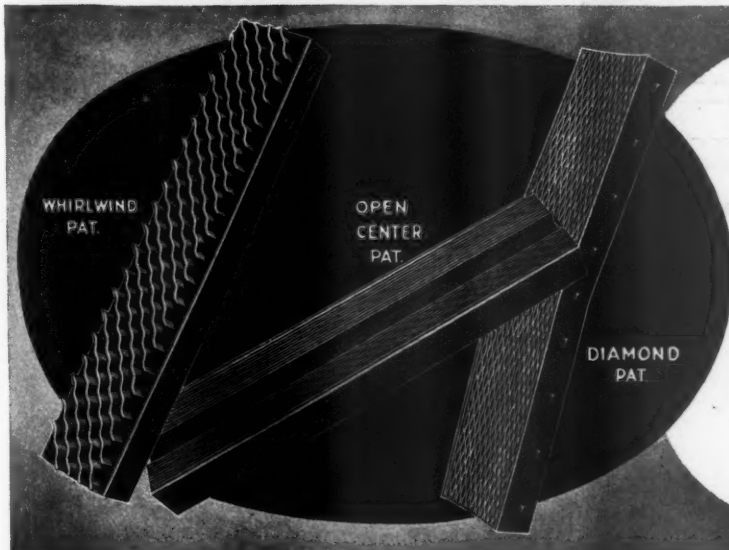
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# SITKA SPRUCE PULP MILL TO START PRODUCTION SOON

New Company Being Formed by K. O. Fosse and Associates  
Expected to Take Over Empire Properties  
and Renew Operations

The Sitka Spruce Pulp & Paper Co. plant at Empire, Ore., will soon again be making pulp. This appears to be assured by recent events which point to the transfer of the plant to a new operating company which is expected to recondition the mill and put it into production in the near future.

The Empire plant has been in the hands of the receiver, R. T. Bourns, following its shut-down some time ago. It did not go into bankruptcy, although there was about a million dollars against it. However, certain of the claim holders went to court and obtained judgment liens.

In order to dispose of the property, these judgment lien holders got together and elected three trustees, John N. Mullen, an attorney; Chris Boesen, attorney, and Thomas H. Ness, general manager of the Mountain States Power Co. The lien holders made a trust agreement among themselves, assigning to the trustees the right to represent their interests in the purchase of the property, with certain limitations fixed on their authority.

The property was sold to these trustees by the receiver at a judicial sale on March 6. The sale price is said to be for approximately the amount of the judgment liens.

It is understood that the purchase was made for the purpose of transferring the plant to a new company now being formed by K. O. Fosse of the International Wood & Sulphite Co., and associates.

Other claims against the property are now wiped out except insofar as they have 30 days in which to appeal the court order of sale.

If the final sale is consummated, rehabilitation of the plant will begin immediately upon title being passed. It is estimated that 60 to 90 days will be necessary to complete the work. A general overhaul of the plant is necessary, and practically an entire new steam plant will be installed. The chipping plant will be remodelled, and some of the new patented Gruber barkers installed. It is

expected that the plant will start making pulp again about July 1.

The Sitka Spruce Pulp & Paper Co. cooked its first pulp on November 23, 1929. It has both pulp



K. O. FOSSE

mill and saw mill, the pulp capacity being 60 tons of unbleached sulphite per day, the sawmill cut being 130,000 board feet per 8-hour shift. The original idea was to cut lumber out of the clears and use the balance for chips.

The main equipment in the mill

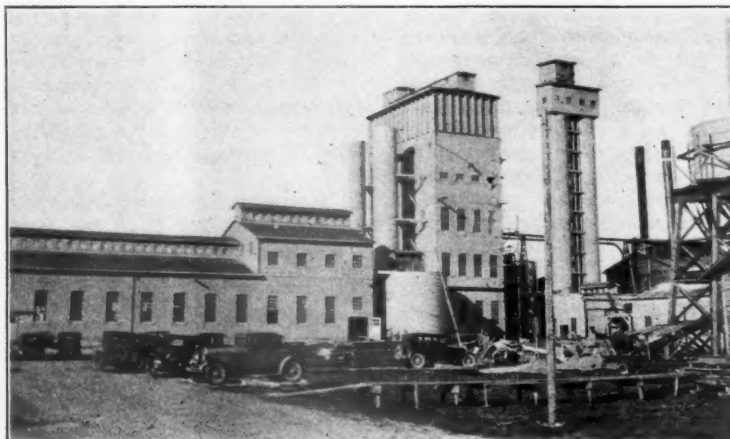
consists of two digesters, 16 feet in diameter, 51 feet high, with a capacity of about 13 tons per cook. The acid system is the usual two-tower layout plus a steam-jacketed sulphur tank. The screen room has two knot screens and five lines of flat screens. The pulp machine has two cylinders, three presses and two suction boxes, with 42 dryers. It trims 96 inches. Water supply is obtained from a series of streams with small dams, the water delivered to the mill filter plant in wood pipe.

Extensive timber stands lie back of Empire in the Coos Bay region; some blocks run largely to spruce, with also Douglas fir, white fir and hemlock.

## B. C. MILLS OPERATING FULL TIME

Lawrence Killam, president of B. C. Pulp & Paper Co., Vancouver, reports business as quieter than last fall, although with prospects fair for an improvement during the coming few months.

Both the company's mills at Woodfibre and Port Alice are operating full time, with orders in hand to assure continuous operation for several months.



The Sitka Spruce Pulp & Paper Co. plant at Empire, Ore.

# SOUNDVIEW CO. OPERATING EVERETT PULP MILL

Leo Burdon Appointed Operating Manager—Armbruster Continues As  
Superintendent—Puget Sound Pulp & Timber Company  
Offices Moved to Clear Lake and Bellingham

The Everett pulp mill which was operated under lease until February 28 by the Puget Sound Pulp & Timber Co. is now in production under the direction of the Soundview Pulp Co., the corporation holding title to the mill properties. U. M. Dickey, vice-president of the company has been appointed general manager of the mill, and is in general charge of the operations. Leo Burdon, formerly with the International Wood & Sulphite Co., and previously with the Rainier Pulp & Paper Co., has been named operating manager in active charge at Everett. G. J. Armbruster, general superintendent of the plant under the previous regime, remains in this position.

## Decree Signed

Following release of the memorandum decision by Judge Guy C. Alston in the suit brought by Kristine Thomle and others to prevent merger of the Soundview company with the Rainier Pulp & Paper Co. and the Olympic Forest Products Co., the formal decree was signed February 26. It differed from the original decision chiefly in that a trustee was appointed with power to lease the properties.

The decree stated that in the management of the affairs of the Puget Sound Pulp & Timber Co. Syndicate, Pierce, Fair & Co., as syndicate manager, were not guilty of any fraud or intentional wrong-doing, nor were the officers and trustees of the Soundview Pulp Co. in the management of their affairs, and that the corporation is not insolvent.

The proposed consolidation with the Rainier Pulp & Paper Co. and the Olympic Forest Products Co. was perpetually enjoined as illegal and not in the best interests of the Soundview company.

The assets of the Soundview company were stated to be held by it for its stockholders and in trust for the certificate unit holders who have not exchanged their trust certificates for Soundview stock. W. C. Grimm, president of the Snohomish County Dairymen's Association, was appointed trustee to take possession of

the pulp mill on expiration of the lease, and with power to lease the plant starting March 1, subject to the approval of the court, and until final disposition of the case, the Soundview company being eligible to bid for the lease.

Notice of appeal was immediately given by the Soundview attorneys and a supersedeas motion entered. This was granted by the court, staying proceedings only as to the trusteeship, while the decree as to the merger and title of the plant can go to the supreme court. In this manner, the Soundview company was placed in a position to operate the plant during the period of appeal, which will probably cover the remainder of 1934, without leasing it from a trustee. Bond of \$40,000 was furnished by the company.

Harry Fair, president of the Soundview company, had returned to San Francisco immediately upon completion of the trial, and succeeded in raising about \$200,000 working capital in addition to the \$100,000 in the company's treasury. This was all raised from stockholders within the organization.

## Large Tonnage Sold

U. M. Dickey, vice-president of the company made a trip east, and while there arranged for the disposal of the pulp to be produced if the Soundview company operated the plant. It is understood that at least 35,000 tons have been sold and that orders for full ten month's operation, or about 50,000 tons, are readily available. Sales are being handled through Bulkley, Dunton & Co.

Upon the Soundview company coming into possession of the plant it was announced that Leo Burdon had been appointed operating manager and that Mr. Armbruster would continue as superintendent. The plant is to operate on bleached sulphite pulp. One of the first moves of the new administration was to raise wages five cents per hour in all departments, affecting about 275 men, and increasing the mill's payroll about \$37,000 over the ten

month period.

The Soundview company will continue to operate the plant at least until the appeal is heard, after which further disposition of the properties may be made. It is generally regarded, however, that the merger with the two other companies is definitely out and that negotiations will not be resumed on the previous basis, no matter what the outcome of the appeal.

## Other Suits Filed

In the meantime, another suit was filed February 28 in Superior Court, Seattle, seeking to enjoin the Soundview Pulp Co. from taking possession of and operating the plant. The complaint was filed by a minority syndicate unit holder, Mr. Ladd, through Dills and Broenkow, attorneys. A temporary injunction as sought by the plaintiff was denied by the court. At the time of writing, papers had not yet been served on the Soundviews officials.

On March 15, another suit designed to remove the Soundview company from possession of the Everett plant was filed by Sam Buck, Friday Harbor, Wash., prosecutor for San Juan County. It is charged that Soundview's possession is illegal, and their ouster is sought. The assumption is that filing of the suit here instead of at Everett was possible because of a small lime-rock quarry in San Juan County belonging to the company.

On the termination of the lease of the Everett mill, the Puget Sound Pulp & Timber Co. moved its general offices to the Clear Lake timber and lumber division at Clear Lake, Wash., and some of the executive personnel was transferred to offices in the Herald Building at Bellingham. The Anacortes and Bellingham pulp plants are running at full capacity, producing more than 5,000 tons of unbleached sulphite per month.

The company is now opening up their large logging operations in the vicinity of Clear Lake, and stepping up log production to approximately 6,000,000 feet per month.

## SUPERINTENDENTS TO MEET IN JUNE

The second meeting of the Pacific Coast Division of the American Pulp and Paper Mill Superintendents Association will be held at the Multnomah Hotel, Portland, Ore., on June 1 and 2.

H. Robert Heuer, division chairman, is busy with plans for a big meeting, in addition to his activities in connection with the coming TAPPI convention. Judging from the first meeting at Longview, the June affair will be a real opportunity for every pulp and paper mill man to not only express his views, but to glean a rich harvest of practical knowledge from contact with many of his contemporary workers.

The fifteenth annual convention of the national association is to be held at Poland Springs, Maine, on June 20, 21 and 22. The scene will be a very famous summer hotel, the Poland Spring House, and the entire hotel will be used for the convention alone.

K. E. Terry, first vice president of the association is acting as convention chairman. He is an executive of the S. D. Warren Co., Cumberland, Maine. The Executive Committee of the association held a meeting in New York during the pulp and paper convention week.

## FRED NEWMAN NOW AT VANCOUVER MILL

Fred Newman, formerly connected with the Hawley Pulp & Paper Co., is now well settled in his new job as superintendent of the Columbia River Paper Mills, Vancouver, Wash.

## WOOD MILL NEARS COMPLETION

The new wood mill of the Crown-Willamette Paper Co., Lebanon, Ore., is nearing completion and will shortly be in operation.

## KETCHEN IN BERMUDA

W. L. Ketchen, manager of the Port Alice mill of British Columbia Pulp & Paper Co., has gone to Bermuda where he will combine a vacation with an investigation of marketing possibilities in the British West Indies. His company has developed an important trade contact with the West Indies, and recently shipments were resumed to South America. Brazil has been a valued customer of the British Columbia mill, most of the pulp being converted into writing paper.

# Spring Meeting of TAPPI

Pacific Section

+

APRIL 6-7

+

Washington Hotel  
SEATTLE, WASHINGTON

## Call Issued For Spring TAPPI Meeting

Come one, come all—that is the call that is going out to TAPPI members and friends from Kenneth Shibley, chairman of the Spring meeting.

The meeting will be held Friday and Saturday, April 6 and 7 at the New Washington Hotel. The usual schedule will be adhered to, members being urged to arrive Thursday night so as to be on hand bright and early Friday morning. And the ladies are invited, in fact, practically demanded by the convention leaders.

Technical papers will be given Friday morning, and the Question Box with round table discussion will come in the afternoon. An informal dinner dance is planned for Friday night. Saturday morning will be occupied with more technical papers and the usual business session. Golf and other recreation will be in order in the afternoon, and there will be the big banquet Saturday night.

Not much more need be said concerning the Spring meeting, for those who have attended before know what a highly interesting and entertaining time will be had, and those who are to come for the first time have heard enough to know their time will be well spent.

This meeting will be particularly

important from the standpoint of preparation for the 1934 International Convention of TAPPI which will be held on the coast this fall. A complete report will be given the members on what has been done toward the big convention, and what plans have been laid for future action.

The publicity committee in the East, headed by G. S. Brazeau, had a great audience to talk to at the TAPPI luncheon held in New York during the annual convention of the American Paper & Pulp Association. The Grand Ballroom of the new Waldorf Astoria Hotel was packed with the largest luncheon group ever gathered together by TAPPI.

The railroad had a fine exhibit; the Northern Pacific had a miniature Yellowstone Park with Old Faithful geyser which spouted every two minutes. Other railroads put on moving picture shows, and the Santa Fe had bulletins that nearly filled the Silver Corridor of the hotel, where most of the lobbying was done. Enthusiasm about the International Convention at Portland was high, and the committee now feels that the number of eastern people who will come to the convention will far exceed the first estimate of 250.



# A NEW CONTINUOUS PULP COOKING SYSTEM

Two Pacific Coast men, Carl E. Braun, mill manager of the Hawley Pulp & Paper Co., and A. H. Lundberg, Seattle chemical engineer, have designed and patented a new and extremely interesting continuous system of making wood pulp.

In the patent papers, the object is stated to be to provide suitable apparatus for fiber digestion with different kinds of chemical liquors in different units of the equipment, and by which the fiber may be washed in one unit after it has been digested in a previous unit, and before it is digested in a following unit with another kind of liquor. It is designed to provide a continuous cooking and washing, or cooking, washing and bleaching system in making chemical pulp.

Reference to the accompanying drawings will illustrate clearly the fundamentals of the system designed.

## Flow Description

The first unit has a chip inlet with measuring valve, and a pair of valves to admit the chips into the drum or digester without affecting the temperature or pressure within. As the chips are fed in, a determined quantity of cooking liquor is introduced. As the chips are cooked they are circulated by a rotatable worm or feeding screw, operating at slow speed. Each worm is perforated to permit circulation of the liquor, and may be fitted with blades for greater agitation.

The chips or pulp move forward toward the outlet end of the cooker, where they are forced over the top of a bulkhead and drop into an inverted cone conduit, to prevent plugging, to the digester into which they enter through a pair of valves, permitting transfer from one cooker to another without affecting the temperature or pressure in either.

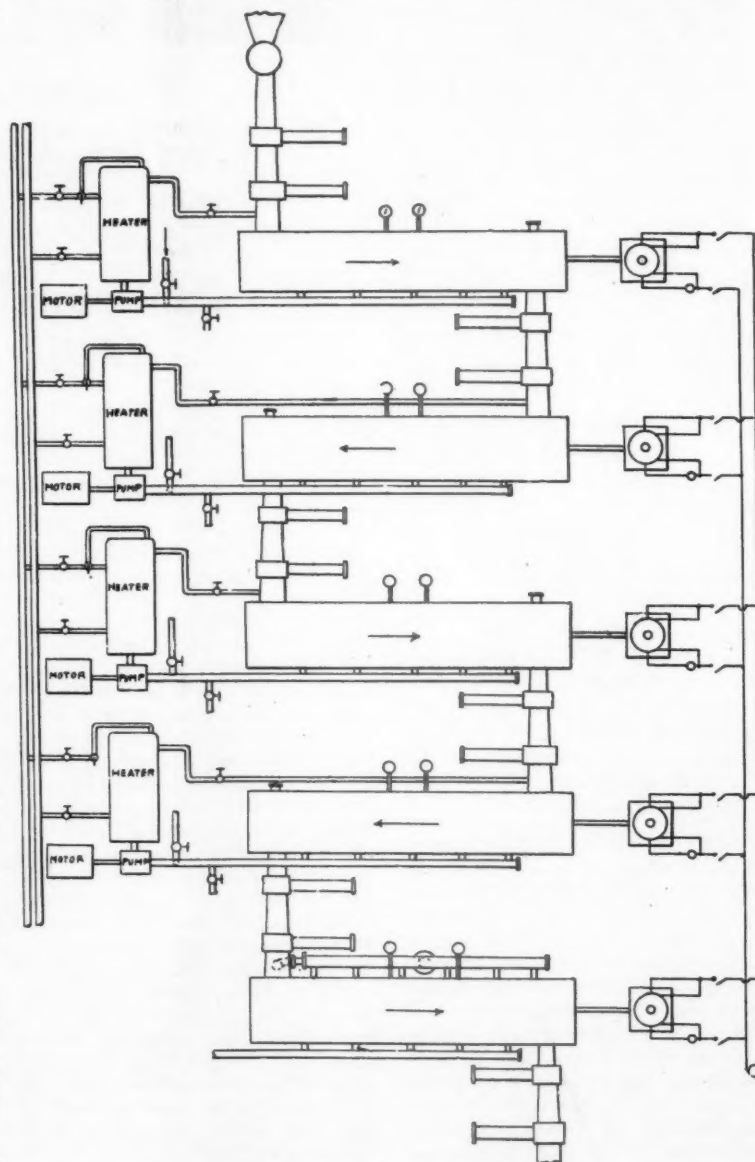
The liquor is drained from each unit and forced by a pump through a rapid heater, or heat exchanger, by which it is maintained in proper condition without dilution from steam. On the digester, the usual outlets for pressure gauges, thermometers, gas relief lines, etc., are provided.

From here on the operation is the same for each cooker, regardless of the number of cookers or of the conditions existing in each. The last unit is the discharge drum, and is the same as the others except that it has a row of inlets at the top to admit water for condensing steam, gases, etc. The bottom has a row of

outlets through which the liquor may be drained for reclaiming if desired.

From the last digester the stock is dumped continuously into a chest or over a washer and on to a knoter and the conventional riffles, flat screens, etc.

In operation, the worm conveyor



General Layout of the Proposed Pulp Plant



in the first unit would be driven faster than the succeeding ones, so as to keep all of the cookers filled as the pulp cooks down.

#### One Man Operation

The system, regardless of size, can be controlled from chip bins to screens by one operator. The operator would be stationed at the last cooker, with before him a control board showing the stage of cooking in the various units by temperature and pressure gauges. An electric master control would enable him to control the speed of the worm conveyors in all units as desired. A portion of the cooking liquor could be circulated down to this control board through glass tubing for observation, or might be drawn off for testing when desired.

In each digester, the temperature, pressure, type or strength of cooking liquor may be controlled individually, and varied as needed for the particular process. Great flexibility would naturally result, and any type of cooking process could be carried on.

It is believed that this system will make a very superior grade of Mitscherlich pulp, that the pulp would



CARL E. BRAUN

always be uniform, and that a greater yield per ton of chips would be obtained.

The liquor may be reclaimed and reconditioned for further use, since by use of the indirect heating system the acid would not be diluted. Cooking time would be shortened, and

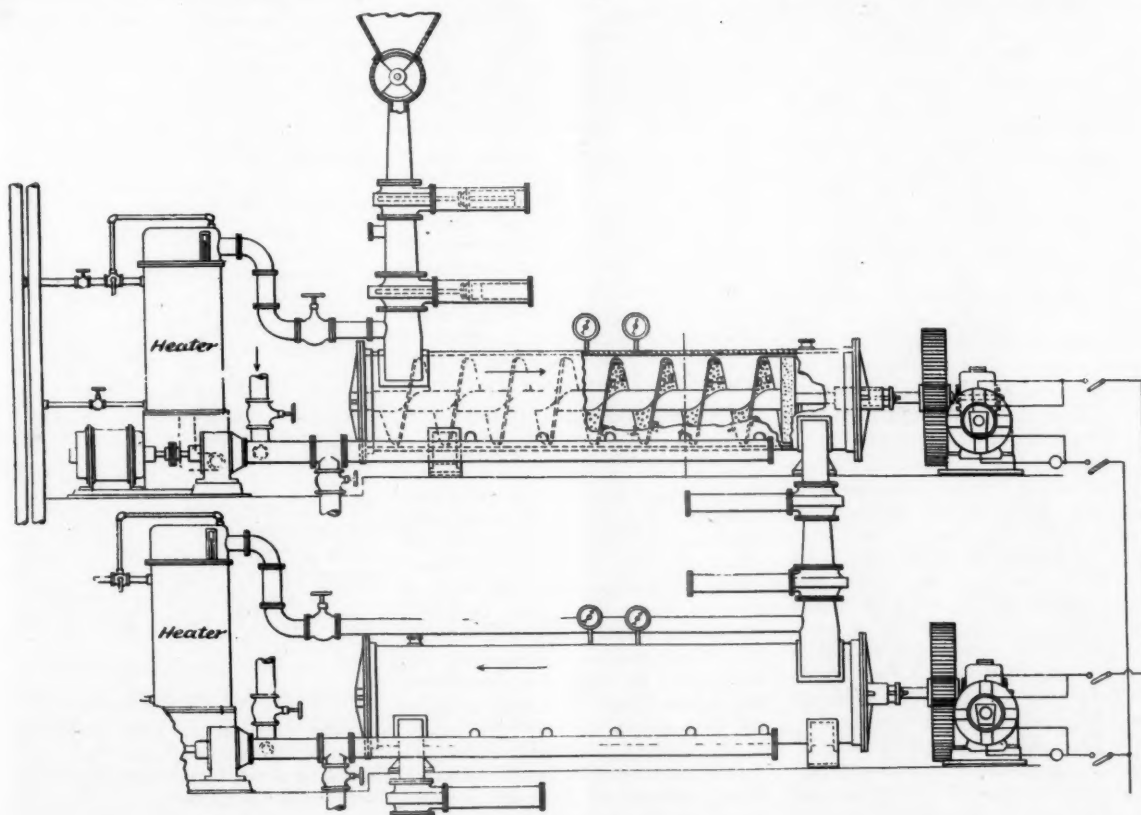
steam consumption lowered. No gases being liberated, the plant would not release any objectionable odors.

#### Plant Cost Moderate

While the system could be constructed of ordinary metals for use in the sulphate process, the cookers can be made of the new chrome-nickel steels so as to be used in making sulphite pulp. Although the new metals are expensive, it is believed that the complete cost of a large daily tonnage plant would be much less than of the present type plants in use. Such a plant could be built in any size units, and the digesters would not require the usual acid-proof linings.

If desired, the same cooking drums could be used for bleaching without ill effect on the equipment or operators.

It is believed that the system will be of considerable advantage in the new two-liquor process which holds promise of successfully cooking Douglas fir chips, first using the sulphate or soda liquor, then washing in one of the chambers, and continuing the cooking by the sulphite process in one or more of the following



Details of the Cooking Units

units. In such operation some of the units are used as sulphate cookers and the sulphate liquor is drawn off from them for reclaiming. The stock is then washed in a succeeding unit and after that is put through the sulphite process in following units. Any number of liquor combinations could be used.

The patent, number 1,938,802, was issued on December 12, 1933. No plants have as yet been built, of course, but it is expected that the first unit, when built, will be a small plant for making sulphate pulp, since this does not require the costlier metals, and would make possible extensive experimental work before building a larger plant.



A. H. LUNDBERG

## Industry to Benefit From Planning Program Under Way

The first regional planning conference in the United States was that held in Portland, Ore., March 5, 6 and 7, when more than 400 leading citizens of Washington, Oregon, Idaho and Montana gathered together for the purpose of launching a fact-finding program with respect to the natural, industrial and economic resources of this region, which ultimately will have a far-reaching effect on the pulp and paper industry.

It is hoped that a clear-visioned understanding of the resources of the Pacific Northwest will result, on the basis of which an intelligent plan for future development may be evolved.

At the first general meeting, Marshall Dana, regional advisor to Federal Emergency Administration of Public Works and chairman of the Pacific Northwest Regional Planning Commission, sounded the keynote of the planning program.

"Its purpose," he said, "is to knit the official agencies and citizens of the Pacific Northwest states, Montana, Idaho, Washington and Oregon, in a plan to make the most profitable use of public works projects authorized for this region, and to outline, subject to planning tests, and covering a ten-year period, a further program of public works valuable to cities, states, drainage areas and the region as a whole.

"Through combined efforts of all concerned we hope to secure a common-sense appraisal of our natural resources, to identify in their utilization and development a basic group

of services and policies, and to integrate with these considerations the public works now authorized and to be proposed. The objective is to learn the extent to which this region may offer subsistence and opportunity to American citizens at the American standard of living, coupled with recreation, safeguards and happiness to which every American is entitled.

"Incidentally, we shall hope to learn the extent to which we may be self-sustaining and self-contained and the further extent to which our needs and our surpluses project us into domestic and foreign trade."

Following the opening session, the conference divided into sections in which there were extended discussions of problems of specific interest to each group. Each section turned in a comprehensive report of their findings and recommendations.

### Program and Policy Committee

These reports were carefully studied by the Program and Policy Committee, which later submitted a number of recommendations to the conference which were unanimously adopted. The committee was headed by Miller Freeman, publisher of Pacific Pulp & Paper Industry, whose early and continuing interest and understanding of planning was recognized by conference leaders in his appointment to the chairmanship of this important committee.

The fact was emphasized that the Pacific Northwest Regional Planning Conference in no way superimposes itself on the four state boards of planning commissions that have re-

cently been set up. The Conference has no administrative or executive authority. On the other hand, it will aim to so shape the state planning programs that there will be no conflicts and that the work of the states will all fit into a harmonious greater Northwest plan.

The purposes of the conference were clearly set forth in the following recommendations of the program and policies committee:

"The purposes of the conference shall be to discuss and further the social and economic uses of public works and lands, the long range planning of public works; the development of general plans and policies for social, industrial, and economic progress; the bringing together of those interested in the various phases of public works, land and other social and economic planning; and the information of the public in connection therewith, in the Pacific Northwest.

"It is the policy of the Conference that it shall be a fact-finding and fact-coordinating body and that it shall not be within its province to pass upon nor to indorse projects other than fact-finding or planning projects. The Conference shall recognize that the consideration of specific projects shall be the function of regularly constituted local, state and regional planning boards."

The report also requested that the regional commission prepare the records of the conference, and transmit them to the President, the PWA, the National Planning Board, heads of certain federal departments, members of Congress from the Northwest, and other interested parties.

During the conference at a meeting of Section D, C. J. Buck, regional forester U. S. Forest Service, presented a very clear picture of the forest situation in the Northwest, particularly from the standpoint of industrial planning. He discussed the problems and cited some of the planning already under way. W. L. Andrews of the Pacific Northwest Forest Experiment Station, explained the work that has been in progress in inventorying the forest resources of the Northwest.

The next meeting of the conference will be in Seattle at a date to be selected.

### BERKEY AT OFFICE AGAIN

Geo. P. Berkey, vice president Crown Willamette Paper Co., after a rest of several weeks in California, recovered from the after effects of pneumonia, and is back at his desk in Portland.

## Oregon Pulp Mill Planned

F. A. Douty and associates have organized the International Pacific Pulp & Paper Co., Portland, and expect to have a pulp mill, a sawmill and a fibre box plant. This firm succeeds the Multnomah Lumber & Box Co., of Portland. Lumber sales, however, will continue to be sold under the name of the Multnomah Lumber & Box Sales Co.

"The first unit of the International Pacific Pulp & Paper Co., is the sawmill we are erecting at the mouth of the Siletz River," said Mr. Douty. "We are proceeding slowly.

This sawmill will be put in operation around May 1. After the sawmill is completed and running in good shape we anticipate building a pulp mill on an adjoining site. We also expect to put in a paper making machine. It may be a year before construction of this unit is undertaken. The next step contemplated is the installation of a fibre box plant in Portland, occupying perhaps part of the site of the old Multnomah Lumber & Box Co. Details of size of the pulp mill, equipment and such matters remain to be worked out."

### JORGENSEN TOURING ORIENT

Oscar Jorgenson, secretary of the British Columbia Pulp & Paper Co., has gone to Japan where he will size up the market and confer with his company's representatives in the Far East. Mr. Jorgenson was in Japan and China for a considerable period last year and made a thorough examination of trade conditions then, but the economic situation changes so rapidly in the Orient that the B. C. Pulp & Paper Company follows the practice of sending a major executive to that field at least once a year.

Advices received by the company's head office at Vancouver indicate that Japan will continue as an important consumer of Pacific Coast pulp, but that plans are afoot to utilize the pulpwood forests of Manchukuo as soon as possible. There has been recurrent talk of the establishment of a large pulp mill in Manchukuo to act as a source of raw materials for Japanese newsprint mills, but Lawrence Killam, president of B. C. Pulp, believes that by the time this venture is launched the market will have grown to such an extent that the new mill will merely take up the slack, without affecting shipments from this coast to any material extent.

Mr. Jorgenson plans to return to Vancouver early in April.

### TEREN RECOVERING FROM OPERATION

Nils Teren, who recently underwent a serious operation in Portland, is recovering and hopes soon to be able to take a look at his desk in the office of the Oregon Pulp & Paper Co., Portland.



O. A. JORGENSEN

### SHAFFER PULP CO. NEARLY READY

The Shaffer Pulp Co., a new organization incorporated recently by Ralph Shaffer and associates to take over the box factory and pulp mill formerly operated as the Shaffer Box Co., is working at full speed in reconditioning the plant and expects to start operating in the very near future.

It is hoped that the mill may be ready for making pulp by around March 20, but it is believed certain that the job will be done at least by the end of the month so that the wheels will begin to turn by April 1.

The pulp mill itself is said to be in good shape, but considerable work is being done on the steam plant and in rehabilitating the sawmill to put it in proper shape for use as a wood preparation plant.

A. D. "Dad" Wood is of course making the pulp again as superintendent, and Arthur Berggren is assistant general manager.

### RAINIER SUIT HELD UP

Motion to dismiss the suit filed against the Rainier Pulp & Paper Co. by Dr. Harry W. Deegan, Shelton, was made early in March. The motion has not yet been argued at time of writing, but this is expected to take place before the end of the month. In the meantime, the date of March 20 tentatively set for opening of the trial, has been abandoned because of this defense move.

If the motion to dismiss is granted, the suit of course will not come to trial. If denied, a later date will be set to hear the evidence.

Dr. Deegan's complaint charges that the Rainier and Olympic companies are controlled by an interlocking directorate, that the Rainier company has a cash surplus of more than \$1,000,000 which is to be used for the benefit of the Olympic mill, that the Shelton plant is to be dismantled and abandoned, and that the directors issued misleading statements in connection with the proposed merger.

The suit asks that the merger be enjoined permanently (a temporary injunction is now in effect), and that the court order that dividends be declared.

Dr. Deegan said, in making a deposition to defense attorneys January 31, that he owns 30 shares of Class A Rainier stock and 30 shares of Class B, that his wife owns five of each, and that he represents 30 more shares of each A and B stock owned by another party.

### WERTHEIMER RECOVERED

R. S. Wertheimer, resident manager of the Longview Fibre Co., who has had a rather serious siege of illness since Christmas, returned from Honolulu a short time ago looking fit and in the best of health again.

### SPAULDING OFFICERS ELECTED

At the annual meeting of the Spaulding Pulp & Paper Co., Newberg, Ore., the following officers were elected: president, J. C. Compton; vice-president, E. Fred Emery; secretary-treasurer, O. M. Allison; additional directors, Charles K. Spaulding, R. J. Moore, H. R. Crawford and Fentress Hill.

### A. E. ERB DIES

Albert Edward Erb, manager of the Davis Paper Box Co., Vancouver, B. C., passed away recently at the age of 59. Born in Preston, Ontario, Mr. Erb had resided in Vancouver for the past 25 years.



# The Determination of Lignin As a Method For Measuring the Degree of Cooking in Pulp Digestion

By JOHN HENDRICKSON\* and  
DR. H. K. BENSON†

The chemical reactions which take place during the cooking of wood pulp are fairly well known, but there are few coast representative methods available for determining exactly whether the wood chips are under-cooked or over-cooked. The control of the cooking process now depends more upon the skill of the digester operators rather than on chemical information.

With this in mind, we made a study of the use of lignin determination as a means of determining the extent to which the pulping reaction has proceeded. It was our purpose to establish an accurate method of analytical procedure whereby the lignin content of both wood and wood pulp could be measured with precision, comparing favorably with the Modified Forest Products Laboratory method (13-bibliography) in accuracy, and in a short enough time to permit its use commercially in the control of the cook.

## Lignin Determination Methods

Among the methods used for determining lignin content, probably the oldest and most commonly used is that of Klason (7), a procedure sometimes ascribed to Ost and Wilkening (9). Finely divided wood was treated with 70 per cent sulphuric acid at room temperature. Konig and his co-workers used 72 per cent acid and made their determination on wood that had been extracted with alcohol-benzene mixtures. Mahood and Cable (10) used a slightly modified procedure, but both allowed the acid to act on the sample for from 16 to 48 hours. Klason (8) recently modified his method by recommending the use of 64 per cent sulfuric acid in contact with the wood for several days. von Euler (5) attempted to apply an acetic acid correction to the lignin determination with 72 per cent sulfuric acid, which nearly nullifies the absorbed sulfuric acid correction.

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An outstanding procedure was recently published by Dr. Noll (11) in which the use of dimethyl aniline in sulfuric acid of 78 per cent strength was proposed. The dimethyl aniline is thought to act as a protector of the lignin particles in the hydrolysis reaction by which the celluloses are dissolved, and as a coagulating agent in precipitating brown gelatinous lignin particles from the diluted acid, making the lignin comparatively simple to filter.

The Forest Products Laboratory's modified method includes temperature control and an elaborate procedure for removing the tannins, resins, essential oils, sugars and coloring matter before hydrolysis with 72 per cent sulfuric acid, and for filtering the lignin.

## The Nature of Pulp Digestion

Little is known of the chemical composition of lignin, but it is often regarded as a mixture of two or more lignins of different constitution but of similar reactions. The lignin complex contains unsaturated groups, and easily forms addition products, is easily oxidized, and contains so-called methoxy groups ( $\text{CH}_3\text{O}$ ), resembling coniferyl alcohol. Klason has shown great similarity between the lignin reactions and the reactions of coniferyl alcohol. He considers lignin to be a condensation product of coniferyl alcohol; and the main reaction in the cooking process consists of the addition of bisulfite to the unsaturated groups of the lignin molecule, forming soluble calcium salts of lignin sulfonic acid.

This latter reaction begins early in the cooking process, but dissolved lignin compounds do not appear in the cooking liquor until the higher temperatures are reached. This and the fact that carbohydrates are dissolved in a fixed proportion to the amount of lignin dissolved indicates that the lignin in the wood is not in a free form, but in a combination with carbohydrates. It must therefore be assumed, according to Haglund (6) that in the cooking pro-

cess insoluble compounds of carbohydrates and calcium salts of lignin sulfonic acid are formed, which at higher temperature are hydrolyzed forming soluble calcium salts of lignin sulfonic acid and dissolved sugars. The speed of the reaction depends on temperature, acid concentration, and pressure, temperature being the most important factor.

According to Klason's theory the lignin complex binds four molecules of sulfur dioxide, two permanently combined to ethylene groups ( $-\text{CH}=\text{CH}-$ ), one less permanently, and one molecule loosely combined with an active carbonyl group ( $=\text{CO}$ ).

Since the sulfur dioxide is added to the lignin as bisulfite, one half molecule of calcium will be used for each one of sulfur dioxide, and it has been suggested as a control test during cooking to determine the amount of sulfur present as bisulfite or "half free" sulfur dioxide.

It is concluded that in the ordinary bisulfite process, the sulfonation of the lignin proceeds by addition of the bisulfite to  $\text{CO}$  groups, followed by rearrangement and addition to the double bond in the acrylic acid side chain of the lignin complex. The excess sulfur dioxide serves in a hydrolytic and deoxidant capacity.

As a result of the purely acid characteristic of sulfurous acid, sugars of the complex kind are broken down into simpler ones. This reaction is responsible for sugar removal and for the loss in yield of cellulose. The fact that cellulose pulp can be produced at all by the sulfite process is not due to the complete inertness of the cellulose, but to a difference in rate of reaction between it and the lignin.

## Methods of Determining Degree of Pulp Digestion

The methods of determining the progress of pulp digestion are briefly as follows:

1. Colorimetric tests such as Cado-gan's permanganate method, by titrating the unused permanganate as Bjorkman (4) does, or by coloring



pulp with standard bleach liquor. These refer to one or two chemical properties only (1).

2. Roe's chlorine figure, a quick and useful test, but using chlorine gas in the laboratory is not convenient.

3. The reaction between nitric acid and pulp is useful but slow.

4. Bleachability tests determine the amount of lignin and other bleach consuming materials in pulp, but are slower.

5. Copper number, giving an idea of the quantity of hydro- and oxy-celluloses present which are formed during cooking and bleaching.

6. The determination of cellulose, requiring much time.

7. The odor of burnt cellulose is used by some digester operators to judge the stage of the cook.

8. Some investigators have found the amounts of carbohydrates dissolved by the use of Fehling's solution and have tried to correlate their data with the claim that the ratio of lignin dissolved to the amount of carbohydrates dissolved is a constant. Although this is true in most cases, it is not a generally accepted fact and should not be used to determine lignin content.

9. The logical means of determining the progress of pulp digestion is by analysis of the lignin content, since the cooking process is essentially the dissolving of lignin from cellulose fiber.

10. The Bergman number (2) gives the active chlorine quantity entirely consumed by the pulp sample during 5 hours at 40 deg. C. and with a 3½ per cent pulp concentration.

11. The Enso number (3) gives the active chlorine quantity consumed in one hour by the pulp at 40 deg. C. by adding 8.86 per cent active chlorine.

12. The Tingle chlorine factor (14) gives the quantity of bromine consumed in 30 minutes by the pulp hydrolyzed in hydrochloric-sulfuric acid, by adding 20-25ccm. N/B solution for 0.6 - 0.75 g. pulp, the result calculated in terms of chlorine.

#### Experimental Results

Spruce unbleached sulfite pulp was analyzed by the modified Noll method and by the modified Forest Products Laboratory method. Six samples were used in each procedure. The average per cent of lignin was found to be 5.47 by the Noll method and 4.90 by the Forest Products Laboratory method, the higher

#### LIGNIN CONTENT BALANCE FOR HEMLOCK

Run Number	1	2	3	4	5	6
*Time of Cook in Hours	4	5	6	7	8	9
Weight of Bone Dry Chips in Grams	1,800	1,800	1,800	1,800	1,800	1,800
Lignin Content of Bone Dry Chips in Per Cent	31.2	31.2	31.2	31.2	31.2	31.2
Weight of Lignin in Bone Dry Chips in Grams	562	562	562	562	562	562
Weight of Bone Dry Pulp in Grams	1,720	1,350	1,000	900	850	800
Lignin Content of Bone Dry Pulp in Per Cent	31.0	25.0	9.85	6.25	5.29	4.92
Weight of Lignin in Bone Dry Pulp in Grams	533	338	98.5	56.2	45.0	39.4
Per Cent Original Lignin Left in Pulp (B d basis)	95.0	60.0	17.5	10.0	8.0	7.0

\*Data used in plotting curve.

figure being due to the inclusion of small amounts of resins which are insoluble in the acid.

Spruce wood was analyzed by both methods. The average for six samples by the Noll method showed 30.34 per cent lignin; by the Forest Products Laboratory process, 29.83 per cent.

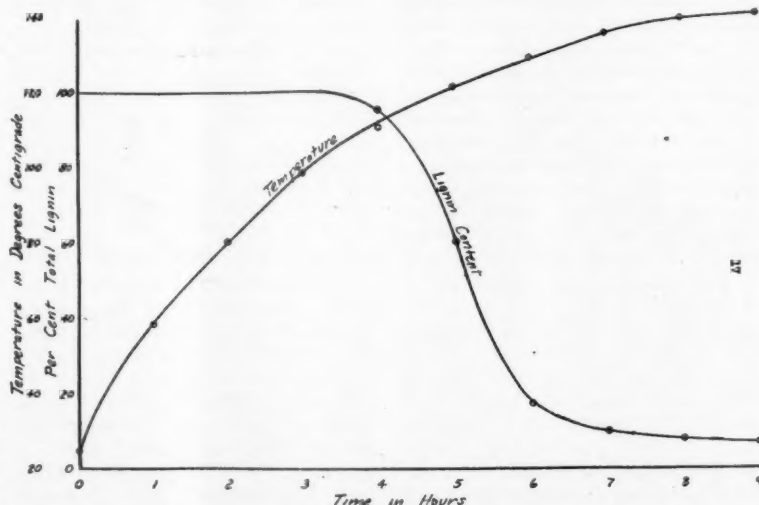
In the application of the modified Noll method for the control of the sulfite cooking process, the hemlock chips were analyzed for lignin content, the average for four samples being found to be 31.18 per cent. The cooking was carried out in a rotating digester of KA-4 metal, heated by a three-phase resistance coil wound around the digester, insulated with asbestos to prevent heat losses. A charge of 1800 grams of bone dry chips was used, with 10 liters of calcium bisulphite liquor. The analysis of the liquor was: specific gravity at 25 degrees C., 1.0603; free SO<sub>2</sub> (available), 4.00; combined SO<sub>2</sub>, 1.20; total SO<sub>2</sub>, 5.20.

Six runs were made, and the pulp analyzed at various time intervals, four samples being taken and the average found. The lignin content

of the chips originally being an average of 31.18 per cent, at the end of four hours, the pulp still averaged 31.00 per cent; at five hours 25.00 per cent; at six hours 9.85 per cent; at seven hours 6.25 per cent; at eight hours 5.29 per cent, and at nine hours 4.92 per cent. The accompanying table combines the data obtained in the six cooks.

The modified Noll method requires one hour, while the modified Forest Products Laboratory determination takes about eight hours. The time factor is such that the Noll process may be useful as a means of control in the cooking. The average of each method of analysis differ by 0.49 of one per cent for spruce wood, and 0.57 of one per cent for unbleached sulfite pulp, comparing favorably in accuracy.

By means of typical analyses taken at varying time intervals, and with the knowledge of the rate of decomposition of cellulose as the time of cook is increased, it is possible to calculate the optimum time of cooking, that is, when the maximum amount of lignin is removed, and



Curves Showing the Reduction of Lignin Content During Pulp Digestion in Relation to Time of Cook and Temperature Rise

consistent with the maximum recovery of cellulose.

#### A Proposed Procedure for Lignin Determination As a Control Method

The following procedure, a modification of the Noll method, is proposed for the analysis of wood pulp and wood of the conifers for the lignin content. This method is found to work equally well for wood and wood pulp except that the time of hydrolysis for the former is comparatively greater owing to the greater resistance of the wood fibers and the smaller area of contact per unit mass of cellulose of the acid in the case of the wood. It is adaptable to the control testing in the sulfite process but its scope is unlimited in the analysis of any wood pulp.

**I. APPARATUS.** No special apparatus is required to make the analysis, ordinary laboratory apparatus being sufficient.

**II. TEST SPECIMEN.** A quantity of pulp or wood is ground in a Koerner disintegrator to a fine powder which is separated, so that the particles passing through a 60-mesh screen are recovered and the retaining material rejected. The 60-mesh powder is dried at 105° C. for one hour and divided into samples weighing approximately 1 gram each.

**III. PROCEDURE.** One gram of the sample is put into a small beaker and pressed together with a glass rod. To the beaker, 5 ccs. of pure dimethyl aniline are added and then 25 ccs. of sulfuric acid of 78% strength. The mass is stirred a few times.

To determine that all the cellulose is decomposed to sugar, a parallel determination is made. About 20 drops are taken out of the solution and added in a test tube to 1½ ccs. of distilled water. If a precipitate is formed, the cellulose is not yet completely decomposed. If no precipitate is noticeable, 20 ccs. of grain alcohol is added and the contents shaken. If any cellulose dextrin is present, white flecks appear which can easily be distinguished from the brown lignin particles.

If this parallel determination shows that all the cellulose is decomposed, then the main determination is diluted with 200 ccs. of hot water and boiled for five minutes. After ten minutes the lignin is filtered in a tared Gooch crucible dried at 105° C and weighed. Asbestos is used as the filtering medium. After weighing the Gooch is ignited, cooled and weighed; the difference in weight being the amount of lignin.

Caution should be observed in determining when all of the cellulose has been hydrolyzed. Four check samples are considered necessary for accurate representative results.

**IV. REPORTING.** The lignin content is reported on the ash free basis, and refers to the oven-dry weight of the sample dried one hour at 105° C.

**V. ACCURACY.** The results of analyses of hemlock and spruce pulp and spruce wood indicate that the average of the tests give an accuracy of (plus and minus) 0.2 of one per cent. This is about the limit of accuracy to be expected. This duplicate determinations usually check within 0.4 of one per cent.

**VI. Additional Information.** The original source of the method is as given in bibliography. Dr. Noll (11) describes the method in a voluminous article and discusses thoroughly all details, especially the time factor.

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#### HAWLEY SAFETY MEETING

On March 15 a general safety meeting was held at the plant of the Hawley Pulp & Paper Co., Oregon City, Ore., with E. R. Brown, of the National Safety Council and R. E. Jackson, industrial accident claim agent of the Oregon Industrial Accident Commission, the speakers. In attendance were the foremen from each department. Each foreman brought one man with him from his department.

#### B. C. HEMLOCK WASTE CHARGED

Powell River Co., Ltd., and other British Columbia newsprint manufacturers are continuing their experiments designed to utilize an increased proportion of hemlock in their production processes, but large quantities of hemlock suitable for pulpwood are still being wasted in British Columbia as a result of reckless logging, according to charges made in the provincial legislature by Ernest Bakewell, representing Mackenzie district in which the Powell River Company operates.

Mr. Bakewell claimed that from forty to fifty million feet of hemlock suitable for pulping were being wasted annually because British Columbia loggers continued to use the destructive high-lead system of logging instead of a selective system, as had been adopted in the West Coast states.

Experiments of the Crown Zellerbach Corporation in selective logging were cited as arguments in favor of the same methods in British Columbia. Mr. Bakewell recommended the use of tractors instead of donkey engines and said the government should insist on the universal use of selective logging.

Only in one year during the last twelve years has the annual cut in British Columbia woods failed to exceed the possible annual growth, according to Mr. Bakewell. In 1933, when markets were relatively quiet in many grades of lumber, the cut was 10 per cent in excess of the natural growth.

These statements did not go unanswered. R. V. Stuart, secretary of the British Columbia Loggers Association, denied that logging methods as practiced in the B. C. woods were wasteful and said that conditions in the forests of Oregon, where selective logging was being done, were very different from those in B. C., where topographical conditions and the nature of the forests handicapped efforts at selective operations. Mr. Stuart believed that the Crown Zellerbach experiments were of great value, however, and that adoption of tractor logging would undoubtedly bring about more general application of selective timber handling. He said, however, that the market for both cedar and hemlock was limited and the industry had a great surplus of these species on its hands. The loggers could not be expected to take out unsalable timber.

**MURRAY NAMED ON CODE AUTHORITY**

J. L. Murray, sales manager of the Everett Pulp & Paper Co., has been recognized by Gen. Johnson, NRA, as a member of the Code Authority for the Paper Stationery and Tablet Manufacturing Industry.

**EARL THOMPSON IN BAY CITY**

Earl Thompson, northwest representative of the Great Western Electro-chemical Co. went to San Francisco last month for his annual pilgrimage to the home office. He has been dividing his time between the San Francisco office and the plant at Pittsburg. Earl will be back in his Seattle office about the end of March.

**SPAULDING PLANT RUNNING SMOOTHLY**

The Spaulding Pulp & Paper Co., Newberg, Ore., is running smoothly, turning out a good tonnage of dry, shredded pulp. Prior to resuming operations the wood mill was re-

**RALPH REID**

Who has joined the Spaulding Pulp & Paper Co., as Chemist.

arranged and the chippers placed for straight line production. "We are well pleased with the chemipulp recovery system installed," said J. B. Wilt, superintendent. "This system is working well and is resulting in a substantial saving. We are also well pleased with the white water recovery system installed and the savings resulting from its operation."

The plant is obtaining about 50 per cent of its wood requirements in the form of cord wood, the balance being in log form. Ralph Ried, chemist, is busy, but pleased with the quality of pulp turned out. F. L. Odon is master mechanic and H. M. Washbond is office manager.

**1933 NEWSPRINT PRODUCTION**

Newsprint production in North America during 1933 was 43,000 tons greater than in 1932, according to figures recently released by the News Print Service Bureau. Canadian production increased 5 per cent, while United States production declined 6 per cent.

Production by countries during 1932 was:

Canada .....	1,914,316 tons
United States .....	1,008,588 tons
Newfoundland .....	271,804 tons
Mexico .....	12,683 tons

Total ..... 3,207,391 tons  
During 1933 newsprint production was:

Canada .....	2,017,004 tons
United States .....	946,374 tons
Newfoundland .....	270,834 tons
Mexico .....	16,367 tons

Total ..... 3,250,579 tons

**DAVID JORDAN HERE**

David C. Jordan, of F. C. Huyck & Sons, Albany, N. Y., is visiting the West Coast pulp and paper mills, making his headquarters with the Pacific Coast Supply Co.

**COMMUTING BETWEEN PACIFIC AND ATLANTIC COASTS**

John H. Smith, vice president and general manager of the Hawley Pulp & Paper Co., Portland and Oregon City, is commuting between the Atlantic and Pacific Coasts. In late February he was in New York City and after looking over the situation with respect to business he returned to Portland. The larger group of business executives report improvement in business and are encouraged over the outlook; a lesser group, though a substantial one, does not report improvement and is rather dubious over the outlook. Mr. Smith points out that this situation always prevails.

Major Watson Eastman, president of the Hawley Pulp & Paper Co., is encouraged over the pulp and paper outlook. Newsprint demand has shown improvement, though he anticipates that this division of the industry will improve more slowly than any other division.

Early in March, Mr. Smith, almost as soon as he returned to Portland, turned about and went back to Washington, D. C., in connection with presenting to government authorities the proposed reorganization of finances of the company. He returned to Portland about the middle of March.

**LEADBETTER BACK FROM EAST**

F. W. Leadbetter, president of the Oregon Pulp & Paper Co., Salem and Portland, has returned from a trip through the East. He brings an account of improvement in business conditions.

**BRISBOIS AT NORTHWEST FIBREBOARD PLANTS**

N. M. Brisbois, operating manager of Fibreboard Products, Inc., arrived in the Northwest from San Francisco March 11. He spent a

**N. M. BRISBOIS**

day at the Sumner plant, then going to Port Angeles. It is understood several improvements are contemplated at the Port Angeles plant of sufficient importance to bring Mr. Brisbois here for a conference on the proposed changes.

**RAINIER MAKES IMPROVEMENTS**

Improvements in the water supply system of the Rainier Pulp & Paper Co. at Shelton, Wash., have recently been completed. Due to certain bad railroad cuts adjoining Goldsborough Creek and immediately above the pipe intake, the mill found itself handicapped in obtaining a suitable flow of clear water during the rainy season. In addition, the Shelton plant has stepped up its production since it started, requiring greater water supply.

For this reason it was decided to extend the water system to a point higher up the creek, thus obtaining a cleaner source of water at all times of the year, and increasing the head of the pipe, giving a more abundant supply of water at the plant.

It is understood that further improvements are now being made by the installation of circulating systems on the digesters.



# STAINLESS STEELS\*

## Chromium and Chrome-Nickel Corrosion Resistant Steels— Their Early Development—Types of Stainless Alloys—Corrosion Factors— Applications

By C. C. SNYDER†

In nearly every industry certain developments are made which are considered outstanding achievements and are thenceforth used as a basis of comparison for later developments.

The expression is often heard in the automotive industry "the most startling advancement since the self-starter—or since four-wheel brakes". In other fields similar comparisons are made of this and that improvement or invention, and often there is a disagreement as to what the real and true stepping stone to progress has been. This doubt, however, does not exist in the steel industry, and it can be sincerely said that in the future, when speaking of a striking advancement, the expression used will be "the greatest improvement since the introduction of stainless iron and steel".

With the great and varied number of applications for stainless steel, it is obvious that no one type of alloy would have properties sufficient to cover the whole field. For instance, a stainless or corrosion resistant alloy that is used for a milk pasteurizer should not be expected to withstand high temperature oxidation, or an alloy that is satisfactory for mild atmospheric corrosion resistance may not be suitable for a strong acid solution. It is apparent then that there must be a number of stainless alloys for different conditions. Sound judgment, backed by a precise knowledge of the characteristics of these metals, must be displayed in order to derive their maximum benefit and to forestall misapplication.

### Early Development

Before attempting to discuss the various types of stainless, perhaps a short history of the early development of chromium and chrome-

nickel corrosion resistant steels would not be amiss.

In 1913, H. Brearley of England, while experimenting with alloys for small rifles and liners for naval guns to resist erosion, observed the resistance of high chromium alloys to atmospheric and salt air corrosion. He also observed the effect of heat treatment upon solution characteristics, the results of which led him to this alloy 11-14% chromium for cutlery, and which, today, with .30 to .40 carbon, is the standard stainless cutlery steel.

Haynes' work and patents in this country, in 1919, which covered Brearley's claims, were ultimately bought by the American Stainless Steel Co.

Meanwhile, Strauss, of Krupp Works, obtained patents on the chromium-nickel alloys, first filed in this country in 1913. This was followed by those of Armstrong and Johnson on chrome-silicon and chrome-nickel-silicon alloys, respectively.

### Confusion in Trade Names

This barrage of patents, as well as many others recently added, has led to considerable confusion—it seems that nearly every steel manufacturer has entered the stainless field, making this or that analysis, and all of them being sold under trade names, such as Republic's "Enduro", "USS 12", "Carpenter No. 4", Allegheny's "No. 33", and a host of other non-identifying names. To add to this, a number of rash claims have been made regarding what this and that alloy will do. Often the application has been made to suit the alloy on hand, rather than the specific alloy applied which would give the desired results. It is not hazarding too much to believe that in the near future the different types of stainless alloys will be standardized, just as the SAE steels are now, and a definite name or number be given to each type analysis.

I believe the various types of stainless alloys can be divided into divisions as follows:

- Type A—10-15% chrome.
- Type B—15-30% chrome.
- Type C—16-20% chrome.
- Type C—16-20% chrome — 7-10% nickel.
- Type D—Chromium-nickel combinations not listed above, and containing silicon, copper, molybdenum and tungsten.

### Types of Corrosion

In order to simplify the corrosion picture, I will divide the possible corrosive conditions into three classifications:

- (1) Atmospheric Corrosion—Meaning exposure to weather conditions.
- (2) Liquid or Wet Corrosion—Meaning partial or complete immersion in corrosive liquids.
- (3) Dry Corrosion or Oxidation Resistance—Meaning scaling at elevated temperatures.

In the atmospheric corrosion field, varying corrosion resistance is shown by the 12% chrome iron (A), the 18-18 chrome iron (B), and the 18% chrome-8% nickel iron (C). The greater the percentage of chromium and nickel, of course, the greater resistance to weathering, staining and rusting.

Wet corrosion depends upon a number of factors, such as concentration of the solution and its temperature, whether agitated or still, the amount of dissolved oxygen present and electrolytic action due to contact with dissimilar metals.

For the above reasons, it is very difficult to recommend a certain type alloy for an application unless all the details are accurately known. Consequently, the prospective customer is often asked to run a service test before final recommendation or adoption is made. Types A, B and C are the ones usually considered for liquid or wet corrosion.

The dry corrosion or scaling field is a large user of the chrome and chrome-nickel alloys. The type of alloy is usually determined by the

\*Presented at the Conference on Manufacturing Methods, University of Washington, Seattle, March 8, 1934.

†Engineer, Republic Steel Corporation.



operating temperature of the furnace or the part—the higher the temperature, the greater the chrome or nickel content should be. The operating condition, that is, whether continuous heating or alternately hot and cold, also enters into the problem. This is pertinent because of the fact that, due to their high coefficient of expansion, some of the types have a tendency to cast off their protective scale when alternately heated and cooled, and rapidly fail.

The two types which predominate in this field are (B) 25-30% chromium, and (D) special chromium-nickel and silicon analyses.

#### Stainless Steel Types

A discussion of the steels, type by type, will follow:

**Type A—10-15% Chromium.** As stated previously it had been discovered years ago that a ferrous metal, in order to resist certain types of corrosion, must contain in excess of 10% chromium. If sufficient carbon is present (.30-.40), this alloy responds to heat treatment in the same manner as ordinary steels, and may be quenched and drawn to a hardness of 600 Brinell. Chromium, however, produces a sluggish effect on the transformation changes, necessitating a high quenching temperature—1700 deg. F, or higher. The effects of quenching are dual, that is, not only hardness is obtained, but the chromium carbides are put into solution, thus making the alloy corrosion resistant as well. The 10-15% chromium with .30-.40 carbon is known as stainless steel, and has come into common usage for cutlery ware. This type, with carbon under .10, does not respond readily to heat treatment, and the treatment is not necessary for attainment of corrosion resistant properties.

The 10-15% chromium type is the least corrosion-resistant of the stainless alloys, and fails rather early in the salt spray. Its place is for mild atmospheric and low temperature scaling operations.

Certain elements have been added to this type mainly sulphur, molybdenum, zirconium and copper, to make it free machining. The best properties are usually obtained with heat-treated material.

**Type B—15-30% Chromium.** Following the advent of the "A" type steels, the value of the 16-18% chrome 1.0% silicon became noticed, and its greater corrosion resistant properties were soon put in use. Unlike the lower chromium steel, this type does not respond to heat treat-

ment unless the carbon is very high. The carbon is usually held under .12, this analysis being commonly known as stainless iron. Its use is restricted to certain applications by its physical properties. It has just fair drawing qualities; in fact it is not recommended for any deep drawing jobs, but mostly for flat work, bends and light draws. It does not lend itself readily to welding, the welds being coarse-grained and brittle at room temperature. Extreme care must be exercised in the hot working of this type as excessive brittleness can be produced by working too hot. Since the metal has no transformation point, the grain cannot be refined except by further hot working. Finishing temperatures for forging, Van-Stoning, flanging, rolling, etc., should not exceed 1600 deg. F. Ductility is obtained by annealing between 1350 deg. and 1560 deg. F. 16-18% chrome resists nitric acid completely, and its big outlet in the wet corrosion field has been in connection with the manufacture and storage of nitric acid and ammonia. It is oxidation resistant up to 1500 deg.—1600 deg. F. for intermittent or continuous heating, and has seen a lot of service for annealing and heat treating belts. The automotive industry has taken to this analysis with wide open arms and is making use of it in cowl mouldings, radiator and hub caps, running board trim and numerous other bright metal parts. Cold welded strip is usually supplied for the above requirements.

Chromium contents of 25-30% are used mainly for heat resistant parts, and exhibit considerable brittleness. They should not be used when high strength or ductility is desired.

#### Eighteen and Eight

**Type C — 16.5-20% Chromium, 7-10% Nickel.** The next step in the development of corrosion resistant steels led to the introduction of the 18% chromium 8% nickel grade. In most respects, particularly its physical ones, 18-8 is directly opposite to the straight chromium types. It is a single phase alloy; that is, its structure is austenitic and virtually non-magnetic. Because of its single phase structure, 18-8 should be, and is, admirably suited for maximum resistance to atmospheric and liquid corrosion. It has remarkably ductility, showing Olsen cups of .450-.575, and 40-50% elongation in eight inches in sheet and strip stock. This excellent and useful ductility is attained by the use of a high heat

treatment, followed by rapid cooling. If the object being annealed is light gauge—such as sheet or strip stock—air cooling suffices, but if a heavy section is to be treated, quench in water to avoid the possibility of precipitation of carbide in the grain boundaries, which lessens greatly the ductility and corrosion resistance. It welds easily, the resultant welds being tough and, corrosion-resistant, when properly made. Being an austenitic alloy, it work-hardens rapidly. However, subsequent high temperature annealing removes all cold working strains and softens the material, making further cold working possible.

Between the temperatures of 1300 deg. and 1600 deg. F, this alloy exhibits a range of reduced ductility and while this amount be termed a brittle range, inasmuch as the ductility as expressed in per cent elongation does not go below 40% in two inches at the lowest point, still care should be exercised that safe stresses are applied when the alloy is to be used in this range.

For high temperature work, that is in excess of 800 deg.-900 deg. F, or for welded construction subject to severe corrosion, usually .08 carbon maximum is specified. For applications other than these, carbon range of .08-.16 is standard.

It might be well to go into some detail with the explanation of why the two divisions of carbon range. At temperatures about 1100 deg. F, and up to 1600 deg. F, very rapid carbide precipitation occurs. As stated before, this causes marked loss of ductility and corrosion resistance. In order to combat this tendency, the carbon is lowered to a point (under .08) when its effect is practically negligible. (Special low carbon ferro-chrome is used in melting this type of heat).

High temperature treatment, 1850 deg. F or higher, is necessary to replace the carbide into complete solution again, followed by rapid cooling to prevent subsequent precipitation.

#### Special Alloys

##### Type D—Special Chromium-Nickel and Added Alloys for Heat Resistance and Special Purposes

Using chromium and nickel as a base, various percentage, plus alloying elements such as silicon, molybdenum, tungsten and copper, are available for special purposes. Enduro 18-8-B, which is 18-8 plus 2½% silicon, shows scale resistance to 1700-1800 deg. F, against 1600 deg. F for the straight 18-8. 18-8-B

has seen some applications in the new mercury boiler, and is showing results up to expectations. 18-8 plus 2-4% molybdenum is said to be more resistance to the inorganic acids and sulphite liquors as present in the paper pulp industry than 18-8. Enduro HCN, an alloy of 22-25% chromium and 12% nickel, is seeing service in this field. HCN also has remarkable scaling properties, being resistant to 1900-2000 deg. F, and maintaining considerable strength and ductility at these temperatures.

Still another combination, NC-3, 25% chromium, 20% nickel, 2-3% silicon, resists oxidation up to 2150 deg. F, and has a higher strength at elevated temperatures than 18-8. The future will see widespread use of these latter alloys, as their properties and characteristics become better known, and as they become more readily available in all forms. NC-3 has seen some service in the hydrogenation process of obtaining gasoline. This is the process in which a barrel of gasoline is obtained from a like amount of crude oil, simply by passing hydrogen at high temperature and pressures over the crude oil. Welded types, as well as large hollow bored cylinders, of NC-3 are being utilized in this field.

### Welding

The four classes discussed may all be welded, either by arc resistance or acetylene gas. It has been my endeavor to state the characteristics of each type as I went along, and I hope that you will be able to appreciate their possibilities from a welding standpoint.

As Class A, 10-15% chromium, is a hardenable alloy, you will naturally expect welds to be hard and brittle. Such is the case and, altho annealing at 1450-1500 deg. F will soften the welds, it is not always practicable to do so.

Class B, chromium 15-30%, having no transformation range in the sense of the word, will, therefore, have the large grained cast structure in and adjacent to the weld, causing extreme brittleness. Annealing, if practicable, will somewhat soften the weld, but even so the weld would be classed as brittle. It should be stated, however, that the brittleness exists only at room temperature, or lower, and up to 250-300 deg. F, at which point toughness is apparent in the weld and adjacent metal. For this reason, applications at elevated temperature permits the use of this type. On cooling down to room temperature again, the metal will be

brittle and should be handled carefully.

Classes C and D, chromium-nickel. Special alloys are austenitic, and hence quite ductile. It is obvious that for welded construction this type is highly recommended. The danger of carbide precipitation has already been mentioned and can be taken care of by heat treatment or the use of low carbon material.

For electric arc welding, rods of the same material having a special flux coating should be used. Polarity should be reversed, that is, the electrode should be positive and the work the negative. Gas welding should be done with a slightly reducing flame.

### Paper and Pulp Industry

The sulphite branch of the paper and pulp industry offers many corrosion problems of a very serious nature. The sulphate or alka line process is relatively free of such conditions, so the present discourse will be restricted to the sulphite process. The writer is indebted to Mr. J. D. Miller of the York Haven Paper Co. for much of the information which follows:

Most of the corrosion problems are encountered in the manufacture and handling of the sulphurous acid solutions. The sulphite digester which is ordinarily 15 ft. inside diameter by 50 ft. high, and its auxiliary equipment, are subject to severe corrosion. The usual digester construction is a riveted or welded steel shell lined with acid resisting silica brick. Accessories, such as liners for the inside of the digester head, bottom bowls, valves, strainers, thermometer wells, pumps and pipe fittings, have usually been of bronze. Piping has been of heavy copper or brass. Stainless steels of the austenitic types have been proposed for all parts coming in contact with the sulphite liquors and have been used by some mills since 1929. Results in some cases have been very satisfactory and in other, there have been some failures. Metallurgical investigations have been made of all failures which have been drawn to our attention and it has been learned that failures have been due to one of three causes, or perhaps a combination of the three causes — many defects were found to be in the material adjacent to the weld, which is caused by carbide precipitation due to the carbon being too high, as pointed out earlier in this paper. This condition is readily taken care of by holding under .08 max.

The second major point brought

out by investigation was that some failures were due to electrolysis caused by contact of the stainless steel with brass, bronze, copper or other dissimilar metals. When all the fittings, flanges, and connections were made from stainless steel, this objectionable feature was eliminated. And, third, it was developed that the regular 18-8 type of stainless steel is a borderline alloy as far as this application is concerned. In order to make the 18-8 type safe for sulphite processes it is necessary to do two things, either increase the chromium and nickel content or to add approximately 3% molybdenum. The addition of molybdenum seems to offer the best solution and its use has been recommended by the Materials of Construction Committee of the Technical Association of the Pulp and Paper Industry. Several casting producers have standardized on the molybdenum analysis and are reporting excellent service records. Recently a large shipment of plates of this type (Enduro 18-8-SMO) was made to a West Coast fabricator to be used for a digester lining.

The chemical analysis of Enduro 18-8-SMO as recommended for pulp and paper equipment follows:

Carbon .....	.08 max.
Manganese .....	1.50 max.
Sulphur .....	.03 max.
Phosphorus .....	.03 max.
Silicon .....	.75 max.
Chromium .....	18.00/22.00
Nickel .....	7.00/10.50
Molybdenum .....	2.00/ 4.00

It can be furnished in sheets, plates, welded and seamless tubing, is readily weldable and the corrosion resistance in the welded and adjacent zones is equally as good as the base metal due to its low Carbon content.

### NEW FORM OF SAFETY ORGANIZATION

On March 8 a new form of safety committee organization was set up at the plant of the Oregon Pulp & Paper Co., Salem, Ore. A safety committee was formed under the auspices of the Pulp & Paper Makers Union. This committee will work in cooperation with the foremen of each department. One-half of the personnel of the committee will be changed every three months.

"The Oregon Pulp & Paper Company had a good accident record in February, with only three minor disabling accidents," said E. R. Brown, of the Portland office of the National Safety Council.

# FACT and FANCY

## Nellie . . .

How many of you who know "Nellie" Hartnagel, chemist for the Fibreboard Products Co., Port Angeles, Wash., can recite his real name correctly? Not many, for no one ever calls him anything but "Nellie". Nevertheless, on formal occasions, he should be addressed as "Arthur Nelson Hartnagel".

Incidentally, Nellie is one of our recent benedicts, having married Audrey Leonard of Port Angeles several months ago.

And did you know that Nellie has a brother who answers to the nickname "Tee Wee"?

## Ben and Bob . . .

Ben Larrabee had a lot of fun recently at the Weyerhaeuser Timber Co. mill with some pictures of Bob Heuer. It seems that when Bob was named convention chairman for the fall TAPPI convention, an eastern journal published a picture of him, taken about 15 or 20 years ago, and at the same time a more recent photo was printed in Pacific Pulp & Paper Industry.

Ben cut out the two pictures, mounted them nicely on a sheet of pulp, labelling the comparatively slim and sylph-like one "After," and the later one "Before." Then he wrote a stirring advertisement of the fine qualities of the reducing medicine Bob was supposed to have used, and sent it to Mrs. Heuer as a New Year's card.

## Santa Claus . . .

Twenty-two million persons in the United States are now receiving money directly or indirectly from the federal government. In 1916 the government payroll totalled 768,270 persons; in 1931 it contained 1,176,475 names; and at the end of 1933 there were 6,249,888 employed. In addition there were 2,750,000 receiving checks for reducing crop acreage or for veterans relief, and 13,000,010 obtaining direct financial relief.

One of every six wage-earners in the United States is being paid by the government. Add to the above totals the banks, railroads, insurance companies, home owners, exporters, etc., who are receiving government loans, and add in the city, county and state employees, and you get a rough idea of why taxes are high.

## Pagenstecher . . .

Felix Pagenstecher, formerly manager of the Hawley Pulp & Paper Co., is now vice president of the Nekoosa-Edwards Paper Co., Appleton, Wis.

## Rayon Rises . . .

Rayon consumption, exclusive of acetate yarn, in 1933 established a high record for all time, and was 31 per cent about 1931. Rayon production in the United States totalled 207,578,000 pounds, a new record, an increase of 54 per cent over the 134,814,000 pounds produced in 1932, and 45 per cent greater than the previous record year 1931.

## 14 Per Cent . . .

Take what comfort you can from the astounding increase in newsprint exports from the United States to Canada last year, which showed a rise of 14 per cent. Yessir, our shipments to the north increased from seven tons up to the grand total of eight tons.

## L. A. Employment . . .

During 1933 employment in the paper products industry in Los Angeles County increased 31.9 per cent over the previous year.

## Cotton vs. Paper . . .

The U. S. Department of Agriculture says that the 1933 cotton crop income in the South was \$856,776,000, more than double the 1932 figure of \$425,488,000. That's fine for the cotton farmer, but it doesn't lend much support to the justification of taxing paper products to help the cotton men along still further. Why not divide some of that big increase among our needy paper makers?

## Soap . . .

According to the Paper Makers Chemical Corporation, the annual production of soap in the United States amounts to about 3,000,000,000 pounds, or a per capita consumption of 24 pounds. The consumption in Europe is 4 pounds per person. If cleanliness is really next to godliness, Americans should rate fairly high.

Soap manufacture uses many chemicals that are also used in pulp and paper making—rosin, soda ash, caustic soda, casein, lime, sulphuric acids, etc.

## Few Forest Fires . . .

An all-time low record of acreage burned over in the national forests of Oregon and Washington was made in 1933. Only 4,746 acres were burned over, as against 695,253 acres in the high year of 1910. The presence of large numbers of CCC men, readily available for fire fighting, together with favorable weather conditions and public conditions, are credited for the record by federal foresters.

## Club Member . . .

W. P. Donnelly, auditor and assistant secretary of the Columbia River Paper Mills, was recently made a member of the City Club of Portland.

## MAKING CHIPPER KNIVES LAST LONGER

Clark & Wilson Lumber Co., Portland, is operating its three chippers steadily, selling part of the chips to the Firtex Insulating Board Co. and the balance to industrial firms using hog fuel. J. J. Bradley, who keeps the chippers in shape and sharpens the knives, has devised a means of lengthening by six weeks the life of the knives, so that each set now gives about 3½ months service.

The chipper disc was rebored so that a second set of holes for the knife grips is spaced about 1 inch, center to center, from the original knife grip holes. This permits the knives, when worn down, to be secured through the supplemental set of holes. A filler bar 1 inch wide is inserted at the butt of each knife to fit it securely and to prevent driving back. By this method knives can be utilized until worn down to 5½ inches in width instead of being discarded when worn down to 6½ inches.

## PULP AND PAPER EXPORTS FROM FINLAND

Pulp and paper exports reached a new high in Finland in 1933, totalling 2,108 million marks in value against 2,057 million marks in 1932.

The total value of all exports was 5,288 million marks and of all imports 3,926 million marks, leaving an export surplus of 1,362 million marks.

## COAST MILLS INCREASING ARGENTINA SHIPMENTS

Pacific Coast pulp mills during 1933 materially increased their shipments to Argentina, the total being reported as over 3,000 metric tons. Shipments to this market were only about 300 tons in 1929.



# T · R · A · D · E · T · A · L · K

of those who sell paper in the western states

+ + + +

## HOPKINS BACK IN PAPER TRADE

N. D. Hopkins, well-known in the Pacific Coast paper trade, has returned to the game after an absence of several years and is now doing sales and promotion work for Carter Rice & Co. Corporation, San Francisco. Mr. Hopkins formerly was with Blake, Moffitt & Towne and the Zellerbach Paper Co. He says he is very glad to get back into the paper business. During the past few years he has been executor of an estate.

C. H. Beckwith, head of the Carter-Rice coast organization, reports business is considerably better at San Francisco. "We are not only getting more queries but we are turning more of these queries into orders," he says. Carter-Rice in San Francisco have just taken on Exmoor Bond, a new rag content paper manufactured by the Byron Weston Co. of Dalton, Mass.

Mr. Beckwith is executive vice-president of the Pacific States Paper Trade Association and is in line for the 1934-35 presidency at the annual convention at Del Monte in May.

## NEW PAPER CUP COMPANY IN LOS ANGELES

Tom Doane of the Doane Paper Co., San Francisco, reports he recently received a visit from Jack Williams of the Crystal Paper Service Co., Los Angeles, a new company which is manufacturing paper cups, water bottles and similar specialties. They get out an eight-sided cup and Mr. Doane thinks it one of the best things of its kind he has seen in a long time.

## ANDREW CHRIST ON CODE AUTHORITY

Andrew Christ, manager of the Western Waxed Paper Co., Oakland, Calif., is the only westerner on the national code authority for the waxed paper industry. He attended one meeting of this group at French Lick. Mr. Christ has been ill for several months but in March was reported as much improved and very much on the job.



N. D. HOPKINS

## WHOLESALE WELLS SATISFIED WITH CODE

Wholesale paper dealers in the Portland area report themselves well satisfied with the code. It has some rough spots, it brings about situations which for the moment are trying, but it has put the wholesaling of paper back upon a sound basis and with the increased volume of business, which is most evident in wrapping, the outlook is regarded with optimism. Much time is spent in code meetings and in working out details.

Clinton L. Shorno, vice-president, Blake, Moffitt & Towne, is well pleased with the volume of business that is coming in. Naturally it is much better than the volume a year ago but it will be late 1934 before an accurate gauge can be made of just how much better it is.

Vernon C. Scott, of Packer-Scott Co., an optimist by nature who admits it, believes that the improved volume will hold and increase still further. The company is doing a good business and finds conditions much better under the code.

Zellerbach Paper Co., reports an improved volume of business noticeably in varying degrees in different departments, but all in all a much healthier tone to business.

## CONVENTION PLANS PROGRESSING

Louis A. Colton, Zellerbach Paper Co., San Francisco, chairman of the 1934 convention program committee of the Pacific States Paper Trade Association, reports that plans for the coming meeting will be taking definite shape on the return of Arthur W. Towne, Blake, Moffitt & Towns, San Francisco, from attendance at the National Paper Trade Association convention in Chicago. Mr. Towne is president of the coast association and the trade is hoping he induced the new national president, Arnett W. Leslie of Minneapolis, to come west for the convention.

Coast millmen have not yet made definite arrangements for the convention golf tournament which they stage each year. For the past fifteen years Gus Johnson has handled the tournament and dug up the prizes, but now that he is no longer with the Everett Pulp and Paper Co., it is reported a committee may be named to take over his job. On this committee may be Jimmy Gray, Paterson Parchment Paper Co., Harry Goedje, Crown-Willamette Paper Co. or Earl Van Pool of The Brown Co. All three of these men are located in San Francisco.

The convention will be held at Del Monte, Calif., May 10-11.

## SKINNER IN NORTHWEST

E. B. Skinner, San Francisco, representative of The Martin-Cantine Co., visited in the Northwest in March.

## A. P. W. SALES MANAGER HERE

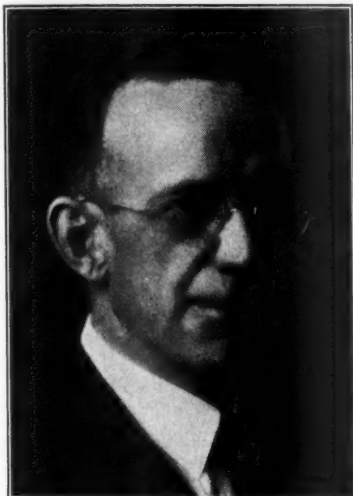
Edward L. Stumpf, Albany, N. Y., general sales manager of the A. P. W. Paper Co., is due on the Pacific Coast in March to take a six weeks' trip over the territory with C. J. Allair, San Francisco, coast manager. Mr. Stumpf will not be here for the Pacific States Paper Trade Convention at Del Monte in May but Mr. Allair will be in attendance and winning golf prizes. Mr. Allair has been a regular at the conventions since 1928.



## Reynolds Leaves General Paper; Succeeded by Harry Bean

W. B. Reynolds, who for the past 13 years has been an executive of the General Paper Co. in San Francisco, is retiring from the firm this month. He will be succeeded by H. D. Bean, an eastern man who has been connected with a number of different mill organizations.

Harry D. Bean becomes vice-president, director and general manager of the General Paper Co., which has offices in San Francisco, Oakland and Los Angeles. Mr. Bean is no stranger to the paper business, for he entered it first in 1902 with the George Irish Paper Co. of Buffalo, N. Y. Later he was with the Minnesota and Ontario Paper Co., newsprint manufacturers of Minneapolis and for twelve years he was with the Abitibi Power and



HARRY D. BEAN

Paper Co. of Toronto, Ont. as purchasing agent. For the past year and a half he has been sales manager of the General company in San Francisco. He left the paper business for a time when he went with the Sherman Corporation, business and management engineers of New York and was in charge of their Canadian operations.

For the past 25 years Mr. Reynolds has been a very active figure in the paper business on the Pacific Coast. With a college training and a successful experience in newspaper work in his early years, he went to Seattle in 1910 to take charge of the old H. N. Richmond Paper Co. at the time that concern was ac-

quired by the Zellerbach interests.

In 1916 Mr. Reynolds returned to California and built up the sales of the California Bag and Paper Co., whose bag manufacturing plant was located in Emeryville, across the bay from San Francisco. He remained with the bag company for four years, leaving to re-enter the jobbing field with the General Paper Co.

No announcement of his future plans has been made by Mr. Reynolds, except that he will first enjoy a badly needed rest before resuming business activity again.

### EASTERNERS VISIT IN S. F.

William C. Wing, Sr., Fox River Paper Co., Fox River, Wis., passed through San Francisco in February enroute to Honolulu, T. H. While in the northern California metropolis he called on Louis A. Colton, vice president and director of purchases of the Zellerbach Paper Co. Other February visitors at Mr. Colton's office were J. Kindelberger, president of the Kalamazoo Vegetable Parchment Paper Co. of Kalamazoo, Mich., and Moe A. Seelig of the Sanitary Products Corp. of Philadelphia.

### PAPER SPECIALTY BUSINESS EXPANDING

The business of the Northwest Paper Sales Co., Portland and Seattle, has grown steadily from the start about a year ago. "The policy of the company is to handle all the West Coast specialty paper products we can find, but where items in demand, or for which there is a latent demand, are not made on the Coast, we make eastern connections", said Geo. W. Houk, manager. The Seattle office is in charge of Marshall G. Hopkins, former California representative for the Pacific Northwest Paper Mills, Portland.

The company has found a substantial demand for colored papers of various sorts. It handles printed cellophanes, printed sulphites, krafts, glassines and tissues of the Pioneer Wrapper & Printer Co., of Los Angeles. Colored wrapping paper is coming into much wider use. For example, in the farmers markets in Portland colored wrapping paper and colored cellophane is coming into considerable favor.

Gold and silver foils, lacquered,

dull, polished and embossed, produced by the Keller-Dorian Paper Co., of New York City, are meeting with a wider demand. Box manufacturers are using them more extensively, and stores employ them for window and display case decoration to enhance the attractiveness of the goods. The Simpson Paper Box Co., Portland, has found foils very effective in the manufacture of jew-



GEORGE W. HOUK

elers boxes. The company is also handling a line of French velours and silk velours, which are used in the manufacture of fancy boxes and are beginning to be used in stores, particularly women's stores, for the finer articles of merchandise and as an aid to display.

A line recently added is the product of the Bakers & Confectioners Paper Specialties Corporation, New York, consisting of corrugated glassine circles and flats, colored and uncolored, pan liners, baking cups, layer liners, paraffined circles and similar articles.

There has also been added recently the Welsh Paper Co., of Philadelphia, line of box covering. The Northwest Paper Sales Co. handles no box boards, but otherwise a full line of papers used for the manufacture of ordinary and fancy boxes. The company is agent for the drug wraps made by Racquette River Paper Co., Potsdam, N. Y., which come in assorted colors with imitation water mark and in country rolls. The company also produces some Christmas wrappings. This line is merchandized through the jobbers.

The company markets matches in Oregon and Washington made by the Lion Match Co., of New York City. This division of the business is growing. A new product put out by the company is the beer pad, a

round pulp board, which is selling in large quantity.

An affiliated firm, the Towel Saver Co., handles the sale of towels and slip-away-toilet covers. This division of the business is also growing.

#### NOVELTY PAPER BOXES MAKE GOOD SELLERS

Theo. Rothschild, secretary, F. C. Stettler Manufacturing Co., Portland, believes in taking advantage of the breaks in creating and selling paper boxes. Mothers Day appealed very much to Mr. Rothschild, so he had designed striking paper boxes in form of books. These boxes were sold to a select list of candy manufacturers, who sold them for Mothers Day. The first venture was small, but the results satisfactory. Year by year the business in Mothers Day paper book boxes has grown, many repeat orders coming in.

Book boxes of this sort have been prepared for lumber companies and industrials of all sort wishing to send remembrances at holiday times. But to show just how keen Mr. Rothschild is, when "Show Boat" was shown, he made a reproduction of the book, got various stars to say how much they appreciated the candy packed in the box by each candy manufacturer, and sold a lot of the box books, the endorsement of the star, with a photograph appearing on the inside.

Now Mr. Rothschild is advocating the packing of baking potatoes, selected for size and quality, in peck boxes and hopes one of these days to get a good volume of business.

#### BONNEVILLE DAM COMMISSION REPORT PROGRESSING

The Bonneville Dam Commission study of resources which may be developed in connection with the Bonneville Dam is nearing completion and is expected to be presented, in tentative form at least, to the governor of Oregon by May 1.

At the recent Northwest Planning Conference in Portland representatives of the commission said that it had come to the conclusion that the pulp and paper industry is one of the most important to be considered in connection with the disposal of power; also that the possibility of developing the rayon industry and the cellophane industry are matters which are being gone into very carefully. The commission is rather sanguine that the latter type of development should prove particularly attractive.

#### MCWATER RETURNS

W. D. McWaters, manager Zellerbach Paper Co., Portland, accompanied by Mrs. McWaters, returned March 14 from a month's trips to the Atlantic Coast. Mr. McWaters reports a pleasant trip, but very severe weather on the Atlantic Coast, particularly in New York, which caused him to cut short his visit.

#### DES MARIAS FADING

H. A. Des Marais of the General Dyestuff Co., otherwise known in unpolite society as "Gob", has recently fallen away to a bare 205 pounds. Gob thinks he would like to take off 15 pounds more, but the betting is that the next 15 will be tougher to get rid of than the first.

#### OPERATING UNDER SIX CODES

"Firms doing a paper converting business have plenty of codes under which to operate," said R. L. Gallo-way, manager Western Paper Converting Co., Salem, Ore., to Pacific Pulp & Paper Industry. "These six codes are small roll paper code; glassine bag code; processors of transparent material code; graphic arts code; stationery code; pulp and paper code. We have a ruling that where a preponderance of work falls under one code, the wage scale applied in that code shall, if desired, be applied to all employees. In some instances this ruling will be applied, but in others it will not."

The Western Paper Converting Co. reports a good volume of business, with inquiries active. The code, or perhaps one should say codes, have in the main been of benefit, though of course there are rough spots which are being worked out gradually. The company is doing a good business in the Middle West.

#### SALEM PLANT AT FULL SPEED

Oregon Pulp & Paper Co., Salem, Ore., is running four six-hour shifts with a full order file. Output of colored writing is being gradually expanded and a pink sheet of good texture and color is now in considerable demand. Major output consists of writing, glassine and grease-proof papers. Wood supply is obtained partly in log form, partly as cord wood and partly as chips. Chips are being obtained from Hammond Lumber Co., Mill City Ore.; Hammond-Tillamook Lumber Co., Gribaldi, Ore., and Willamette Valley Lumber Co., Dallas, Ore.

#### PULP AND PAPER WASTES STUDIED

Seven recommendations applicable to Willamette Valley conditions were made to Dr. C. S. Keevil, professor of chemical engineering at Oregon State College, Corvallis, Ore.; Fred Merryfield, assistant professor of civil engineering; and G. W. Gleeson, assistant professor of chemical engineering, in their report on pollutional strength of "Pulp and Paper Trade Wastes," which they recently filed with the executive committee of the state board of consulting engineers. Analyses of Willamette River water led to the recommendations included in the report, as well as 22 definite conclusions.

The contents of the report cannot be made public until it is accepted by the board to which it has been sent. The report is written so that it may be understood by persons who have little knowledge of technical terms. The authors hope that conditions found to exist in this region will soon be made available for publication.

Twenty-two authorities on the subject of "Pulp and Paper Trade Wastes" were consulted during the preparation of the 125-page report, which contains over thirty abstracts and a number of tables. The authors began investigation and work on this subject last August.

#### INLAND EMPIRE OPERATING THREE MACHINES

Inland Empire Paper Co., Millwood, Wash., is running three machines on newsprint. The company has a moderate volume of orders on hand.

#### JANUARY EXPORTS OF PAPER PRODUCTS DECLINE

Exports of paper and paper manufactures from the United States during January registered a decline of 8 per cent in value as compared with December, but an increase of 48 per cent compared with January, 1933, according to figures compiled in the Commerce Department's Forest Products Division.

Total shipments of such items during January, 1934, were valued at \$1,500,775, as against \$1,631,086 in December and \$1,011,726 in January, 1933.

Eliminating insulating and wall boards, wall paper, and "other paper and paper products," the volume of exports of paper and paper manufactures in January, 1934, amounted to 18,573 short tons, as compared with 23,110 tons during December and 12,629 tons during January, 1933.

## New Beating Development

The E. D. Jones & Sons Co., Pittsfield, Mass. recently announced to the paper industry the development of a new type beating engine known as the Multibeater. It has been designed for use in practically any and every type of mill, particularly those mills scheduled for two hours beating or more. However, the longer and harder the beat the greater the advantages to be gained by the Multibeater.

It is stated that the Jones Company has not only been aware but has partially participated in the development of many of the hydrators or similar machines now crowding the market in an effort to dislodge the Hollander type beater but it is still admitted that the old type Hollander still maintains its position as regards all around flexibility. However, the Multibeater offers a far greater range of flexibility than has ever before been possible even in the standard Hollander.

Acknowledgment must be given to a certain 1933 development which, at least in the board division of the industry, has definitely shown the way towards elimination of the garden variety of Hollander beaters and in this case, it is interesting to note that no hydrator or like apparatus has been used but rather a commercially practical method evolved whereby the stock is prepared through a greater and more intelligent use, than heretofore employed, of the basic principles of hydraulics and hydration.

It is further stated that the new Jones Multibeater, while a departure from the ordinary Hollander beater previously made by them, does provide three of the basic paper making principles that should stand behind any apparatus or method for stock preparation, continuous beating notwithstanding, namely:

1st: To provide a wide range of accurate control to produce the necessary flexibility and proper degree of hydration and desired physical dimensions of the fibre.

2nd: That the effort with any apparatus or method to give lowest power costs should not in any way sacrifice the desired paper making qualities.

3rd: The apparatus to have ruggedness of design and quality of workmanship which insure a life time usage with little change from initial beating results—also keeping in mind desirability of low maintenance costs of the apparatus.

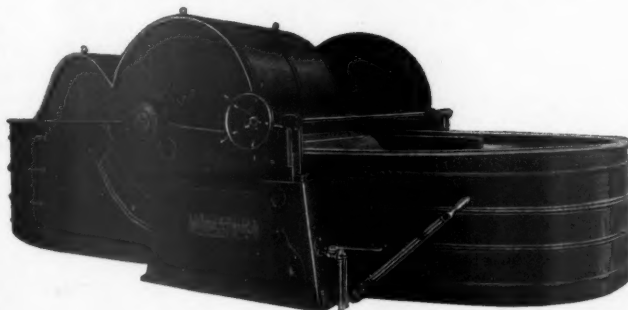
The physical appearance of the Jones Multibeater is similar to that of the standard Hollander but three bed plates are used and cantilever type lighters which give roll adjustment to the true center of the three bed plates instead of the old vertical adjustment method. For the first time in beater design all play has been removed from the beater roll mounting and with a special design of roll adjusting mechanism, all setting of the roll with respect to the bed plates in terms of thousandths of an inch (or fibre thickness, if you will) is now a reality.

There are also some radical changes in the current idea of proper backfall design, and various expedients to give proper circulation, temperature, mixing, beating and emptying qualities. In a commercial installation the Jones Multibeater has shown over a 60% reduction in horse-power hours for the same degree of fibre development on one of the highest grades of paper made in the United States.

Coincident with the development of the Jones Multibeater, the Jones company also announces an automatic continuous electric method for control throughout the beating cycle by maintaining a predetermined load on the main driving motor. This load regulation is obtained by raising and lowering the roll on the bed plate

(Concluded on page 23)

## == The New == JONES MULTIBEATER



### Attains New Peaks of Performance—effecting Sweeping Savings

In actual mill use, one 1,600 lb. Jones Multibeater replacing one 800 lb. regular type Hollander showed a possible increase in daily production capacity of 220%. Horse-power hours per ton of beaten stock were reduced 62%, saving this mill over \$13.00 per ton in power alone. Required H.P. has been cut approximately 40%, while beating time has been reduced 37½% for double the former loading capacity maintaining the same required stock characteristics as before. The beater control is so designed that accurate adjustments to thousandths of an inch may positively be maintained giving flexibility so that same tackle can be used for writings or blottings. Circulation on 5 to 7% consistency rag stock ranged from 30' to 60' per minute, giving excellent mixing qualities.

No stirring is required as there is no stock lodgement. The beater also can be dumped in 6 minutes with no raking. Automatic beating control can be used, saving labor and giving much desired uniformity of beats as well as saving power and beating time.

### Pacific Coast Supply Co.

Seattle—Portland—San Francisco

Exclusive Pacific Coast Representative for the  
entire line of paper mill products made by

# Jones

A name that has won a world-wide reputation  
through 75 years devoted to paper-making progress



## University Laboratory Aiding Pulp and Paper Research

The Chemical Engineering Department at the University of Washington, Seattle, is showing increasing interest in problems relating to pulp and paper manufacture, particularly as they affect the industry on the Pacific Coast. Much creditable work is being turned out by students and research workers, under the direction of Dr. H. K. Benson, Professor W. L. Buschlein and Dr. Kenneth A. Kobe.

Industrial chemistry has long been a forte in this college, and among the technical men now active in the Pacific Coast industry, many have come from the University of Washington. As examples might be mentioned Ralph Hansen, technical director of the Weyerhaeuser Timber Co. pulp division, Nellie Hartnagel, chemist for Fibreboard Products, Port Angeles, Earl Thompson of the Great Western Electro-chemical Co., Harold Hauff and Ed Wood of Weyerhaeuser's Ferdinand Schmitz, Jr., superintendent of the Rainier Pulp & Paper Co., and numerous others. F. R. Armbruster, son of G. J. Armbruster, general superintendent of the Soundview Pulp Co. plant at Everett, will graduate from the school in a few months, and is now doing pulp and paper research.

A. M. Partansky recently finished a research problem on the biological decomposition of waste sulphite liquor. He dealt with a study of the conditions under which sulphite liquor decomposes bacteriologically in the absence of air, and mixed in mud and sea water. All experiments have now been completed, and at the present time the data are being interpreted. This work was made possible by a grant of \$600 from the National Research Council, and its results will be published in the proceedings of the Academy of Science within the next few months.

A continuation of the study during the coming year, in the aerobic phase and in cycles of the aerobic and anaerobic stages, is being contemplated. It is expected that the research will be supported by some of the mills which have indicated their favorable interest.

A recent Master's thesis is that of John Hendrickson on "Lignin

Removal as a Means of Determining the Extent of Cooking". The article by Mr. Hendrickson and Dr. Benson which appears in this issue is based on this study.

Two students are now working on the use of waste sulphite liquor, the work still being in progress. One of them is F. R. Armbruster, who finishes this quarter. He is trying pre-



DR. H. K. BENSON

cipitation with ammonia, getting organic material with value as a fertilizer, and has also been doing work on other methods of precipitation. R. L. Thieme is using an acid precipitation method for the separation of organic matter. By this process it is proposed to precipitate the ingredients which have tanning properties, and to concentrate them into smaller bulk for transportation to tanneries.

Another project is under way by John Hendrickson and R. P. Erwin on the pulping of Douglas fir by the sulphite process. In this process the Douglas fir chips are first extracted with ammonium hydroxide for the removal of resins, and after a single washing, ammonium bisulphite liquor is used for cooking. To date, most of the time has been spent in the adjustment of the ammonia content in the cooking liquor with reference to the ammonium hydroxide in the chips. Cooking is

being done in a rotary digester made of stainless steel, of about two litre capacity.

There is also a problem on the cooking of pulp in multiple stages with calcium bisulphite liquor. For instance a pulp that is 90 per cent cooked is taken and experiments made to find out what happens when fresh concentrated liquor is added, or other conditions imposed. This work is being done by C. F. Leitz.

Another project is the production of plastics from groundwood, being carried on by L. Lowen. He hydrolyzes the pentosans in the groundwood with hydrochloric acid, and from the decomposition products thus obtained, he secures a reaction with phenols and cresols that yields an extremely hard resinous body. This is a furfuraldehyde, somewhat similar to Bakelite resin.

Another student, J. L. McCarthy, is working on the use of a transparent water-soluble resin for water-proofing paper. It is intended that this will be done by surface treatment. He is using different resins in his experiments now, and is looking for one which is sufficiently pliable.

Frank Conrad is working on the solubility of sulphur dioxide and calcium bisulphite in water. The results of this study will provide basic data for use in designing absorption systems.

### McMAHON AND HODGES ON EXTENDED TOUR OF WESTERN MILLS

C. J. "Mike" McMahon, factory representative of the Appleton Woolen Mills came out to the Coast several weeks ago, and in company with Walter Hodges started on a coastwide tour. Between discussions of the latest developments in pulp paper making felts, they planned to visit every mill on the Coast.

Mr. McMahon reported an increase of business every year since 1929, and pointed to the new plant built at Appleton to take care of the larger volume. This is a new four story addition which is materially aiding in faster production of felts, at the same time helping quality and efficiency.

(Concluded from page 21)

through control equipment operating automatically. Many other methods of automatic control have been carefully studied and this was finally selected by them as the most efficient method. This apparatus is known as the Stamets-Duckworth Beater Control.

#### CANADIAN JOURNAL COMMENTS ON OPPOSITION OF AMERICAN PUBLISHERS TO NEWSPRINT RECOVERY

In the February issue of our valued contemporary, Pulp and Paper of Canada, there appears a comment expressing surprise at the lack of intelligence and understanding on the part of American newspaper publishers in their obstinate refusal to countenance any moves which might serve to put the newsprint manufacturers in a position to break even and remain in business.

The frank comment of the Canadian journal is so to the point that we take the liberty of reprinting it, as follows:

"Newsprint manufacturers both in United States and Canada are surprised and disappointed at the attitude which was taken at the recent conference in Washington on the newsprint manufacturers' code. Considering all that the newspapers have contained lately about the fine work done in the introduction of codes calculated to stabilize and encourage further confidence among American manufacturers, it was rather a shock to find the publishing interests so obstructive with regard to the Newsprint Code. The straw man that they are knocking down is the imagined bogey of a monopoly that would unduly increase the price of newsprint. One would think that such leaders of public thought and opinion would have sufficient intelligence to realize that too high a price would invite even under present circumstances the invasion of the field by new capital. Certainly Canadian mills are not asking for any further competition. Therefore they are not looking for any grotesque price. It is not only in their interests but also that of the publishers to have the latter feel that the price of newsprint is going to be sufficiently moderate and well stabilized that they can make definite plans for an increased use of this product. What some large consumers of newsprint evidently want is an unrestricted opportunity to chisel prices down to a point where they will have a definite advantage over their fellow publishers. The administration at Washington does not want that, and we feel that, if paper makers would stand with the President for the successful working out of his policy, conditions will be definitely better. The price of newsprint might very properly go a bit higher, but it certainly should go no lower."

#### CROWN WILLAMETTE SUED ON ODOR

A suit for \$50,000 damages against the Crown Willamette Paper Co. of Camas, Wash., was filed in Superior Court at Vancouver, March 16, by Otis and Bessie Rowen of Camas, who asserted that fumes from the mill have affected their noses and throats to such an extent that their sense of smell has been impaired.

The action is expected to draw considerable attention in view of a related suit brought some time ago by Paul Hinz, also a resident of Camas.

Mr. Hinz sued for damage caused to his property by the paper mill fumes. A Superior Court jury awarded him a verdict of \$5,000, but the court set the verdict aside on the ground it might possibly establish a precedent for innumerable actions of the kind. The Supreme Court, however, remanded the case for retrial. A settlement was reached out of court.

## Be Kind To Your Felts

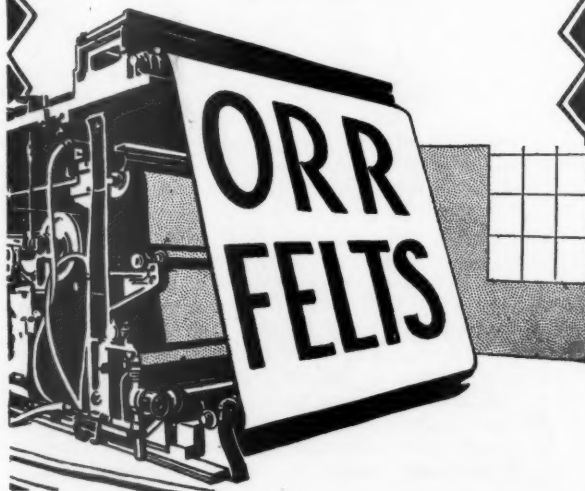
Watch your bearings. A paper machine in good condition is far easier on felts than one with felt rolls out of line and out of level because of worn or broken down bearings.

Check up on your molds, on your felt rolls, on your bottom press rolls, on any and all operating conditions that either directly or indirectly affect the life of felts.

Above all, use ORR FELTS and keep your felt bills under control. Remember that the ORR LINE is complete—the felt best suited to your particular machine requirement available.

Pacific Coast Representative: GEO. S. MEDDIS  
1650 No. Point St., San Francisco, Calif.

The  
Orr Felt & Blanket Co.  
PIQUA, OHIO



## Crown Zellerbach Earnings Up

For the nine months ended January 31, 1934, Crown Zellerbach Corporation reports net profit of \$1,662,566 compared with \$263,989 for the same period in the corresponding period of last year. After deduction of minority stockholders' interest, the balance of profit accrued to Crown Zellerbach stockholders was \$1,016,379, compared with the previous period's profit of \$36,848.

Crown Willamette Paper Co. and subsidiaries, including Pacific Mills,

Ltd., showed a net profit of \$646,007 before deduction of minority stockholders' interest, compared with \$227,485 in the corresponding period of the previous year. After deduction of minority stockholders' interest in profits of Pacific Mills, Ltd., in 1934, and addition of their interest in losses of Pacific Mills in 1933, the profit accrued to Crown Willamette stockholders was \$632,478 for the nine months ended January 31, 1934, compared with \$243,850 in the previous similar period.

### JOHN WATSON VISITS COAST MILLS

John D. Watson, manager of the Wisconsin Wire Works, Appleton, Wis., spent two weeks on the Coast the first part of March, calling at all the northwest mills, in company with Carl Beyerl of the Pacific Sales Co.

### CROWN WILLAMETTE REFORESTATION PROMISES GOOD RESULTS

J. R. Fromm, of the Portland office of the Crown Willamette Paper Co., attended the recent Northwest Planning Conference in Portland and took an active part in the natural resources division. Mr. Fromm said that some years ago his firm had expended \$50,000 in a nursery in which Sitka spruce seedlings were raised and that about \$50,000 was expended in planting the seedlings, mostly in Clatsop County, Ore.

The seedlings mostly were employed to fill in blank spots in the natural regeneration. Growth has been sufficient to make it appear that so far as pulp wood is concerned, planting is commercially feasible on the better soils. The company is much interested in perpetuating the supply of pulp wood.

### 1933 BOXBOARD PRODUCTION UP

Production of boxboard in the United States during 1933 amounted to 2,912,734 tons, 63 per cent of rated capacity. This compares favorably with 1932 production of 2,152,045 tons or 55.1 per cent of capacity. Tonnage produced was greater than any year since 1929, when production was only 169 tons greater.

New orders during the year totaled 2,913,370 tons, slightly greater than production. Waste paper consumption was 2,033,175 tons, less than in previous years, although box board production increased.

### STENSTROM EAST AFTER AUSTRALIA TRIP

D. G. Stenstrom, manager of Pacific Mills, Ltd., Vancouver, no sooner reached Vancouver on his return from a several months' trip to Australia than he was off again for eastern Canadian points. He spent considerable time in Montreal, Toronto and Winnipeg, where he investigated the possibilities for extending his company's market for paper specialties.

Mr. Stenstrom has now been transferred to the sales department, with headquarters in Toronto.

### JANUARY NEWSPRINT STATISTICS

Production in Canada during January, 1934, amounted to 188,374 tons and shipments to 187,352 tons according to the News Print Service Bureau. Production in the United States was 84,194 tons and shipments 84,796 tons, making a total United States and Canadian news print production of 272,568 tons and shipments of 272,148 tons. During January, 25,477 tons of news print were made in Newfoundland and 1,233 tons in Mexico, so that the total North American production for the month amounted to 299,278 tons.

The Canadian mills produced 49,015 tons more in January, 1934, than in January, 1933, which was an increase of 35 per cent. The output in the United States was 9,772 tons or 13 per cent more than in January, 1933, in Newfoundland 3,270 tons or 15 per cent more, and in Mexico 175 tons less, making a total increase of 61,882 tons, or 26 per cent above January, 1933.

Stocks of news print paper at Canadian mills are figured at 34,711 tons at the end of January and at United States mills 17,784 tons, making a combined total of 52,495 tons compared with 52,075 tons on December 31, 1933.

### NEW PULP LOG BARGING SYSTEM DEVELOPED

This month the first barge load of hemlock logs from Willapa Harbor was moved into the Columbia River and discharged at the plant of the St. Helens Pulp & Paper Co., St. Helens, Ore., by the Brix Logging Co., of Portland. The barge employed is the converted sailing schooner North Bend, which was fitted for log hauling service at Astoria, and which has an estimated minimum capacity of 500,000 feet of logs.

### RICHVALE MILL SUED

Suit against stockholders of the Pacific Coast Pulp and Paper Corporation, organized to erect a rice paper mill at Richvale, was instituted recently by L. E. Ellington in Superior court at Oroville, Calif., to recover \$1,000 on a promissory note.

The note was given by the corporation Feb. 21, 1931, and was payable six months from date, with interest at 8 per cent per annum, according to the complaint, prepared by Attorney Raymond A. Leonard, but no part has been paid.

### JAPAN'S PULP IMPORTS

Japanese imports of chemical pulp in December, 1933, were as follows (amounts stated in lbs.): Canada, 6,535,599; U. S. A., 12,708,400; Norway, 4,200,667; Sweden, 5,458,400; Germany, 1,069,201; Europe, 1,802,400; total, 31,774,667.

### CANADIAN NEWSPRINT EXPORTS IN 1933

Canadian newsprint exports totaled 1,838,106 tons in 1933, an increase of 61,342 tons over 1932 shipments. Of this total, 1,519,680 tons or nearly 85 per cent went to the United States. Of the remaining 15 per cent, the United Kingdom took 107,041 tons, Australia and New Zealand 64,435 tons, Argentina 38,831 tons, other Latin American countries 11,230 tons, China 24,414 tons and Japan 32,180 tons.

### FINLAND'S 1933 PULP PRODUCTION SHOWS INCREASE

Chemical pulp production in Finland during 1933 totaled 921,245 metric tons against 869,419 metric tons in 1932. Sulphate pulp was 236,900 tons, and sulphite 684,345 tons.

At the beginning of 1933 Finnish association mills had unsold stocks of 41,000 tons, but the mills began 1934 with practically no stocks on hand.



## UNITED STATES IMPORTS OF PULP WOOD AND WOOD PULP BY COUNTRIES OF ORIGIN

DECEMBER, 1933

Compiled by the U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce  
(Figures Subject to Revision.)

Countries	PULP WOOD											
	Rough				Peeled				Rosed			
	Spruce Cords	Dollars	Other Cords	Dollars	Spruce Cords	Dollars	Other Cords	Dollars	Spruce Cords	Dollars	Other Cords	Dollars
Canada	466	2,024			28,606	190,660	4,877	21,846	335	1,735		
Total	466	2,024			28,606	190,660	4,877	21,846	335	1,735		

COUNTRIES	WOOD PULP													
	Mechanically Ground				Chemical Unbleached Sulphite		Chemical Bleached Sulphite		Chemical Unbleached Sulphate (Kraft Pulp)		Chemical Bleached Sulphate		Chemical Soda Pulp	
	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars	Tons	Dollars
Austria							330	13,361						
Czechoslovakia					674	19,701	1,681	72,861			101	5,509		
Estonia					159	5,465	19	1,117						
Finland	1,188	20,360	50	1,048	10,960	369,165	2,912	134,038	4,004	104,067	25	911		
Germany					4,956	148,073	2,791	128,999						
Lithuania					1,077	32,090								
Norway	15	566	25	546	1,348	48,986	7,334	389,430	1,625	50,282				
Poland and Danzig									238	3,904				
Sweden	1,050	23,419	779	14,756	38,546	1,286,467	5,087	242,654	29,064	815,219	1,142	55,825		
Canada	11,128	185,851			5,621	199,475	17,148	937,472	3,151	106,541	1,350	103,315	392	18,607
Total	13,381	230,196	854	16,350	63,341	2,109,422	37,302	1,919,932	38,082	1,080,013	2,618	165,560	392	18,607

"NON-USERS  
ARE THE  
LOSERS"

TENAX  
FELTS

## SPEED AND ENDURANCE

NOW IS THE TIME  
TO ANTICIPATE BUSY DAYS

As more and more mills from Coast to Coast pick up a growing production load, TENAX FELTS continue to satisfy the requirements of alert superintendents,—Who keep abreast of changing demands; Who have learned to rely on TENAX FELTS.

"Non-users Are The Losers"

LOCKPORT FELT COMPANY

NEWFANE, N. Y.

Pacific Coast Representative: ALAN C. DUNHAM, Portland, Ore.

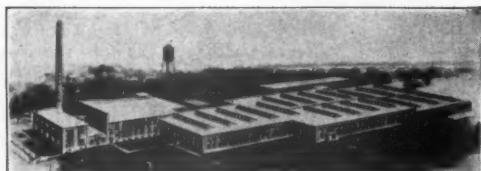
# F.C. HUYCK & SONS

## KENWOOD MILLS

### ALBANY, N.Y.



Manufacturers of Kenwood Felts  
and Jackets for all Pulp and Paper  
Making Purposes since 1870



KENWOOD MILLS LTD. ARNPRIOR, ONTARIO, CAN.



# UNIFORM SUPERIOR QUALITY

*bleached and unbleached*

# SULPHITE PULP

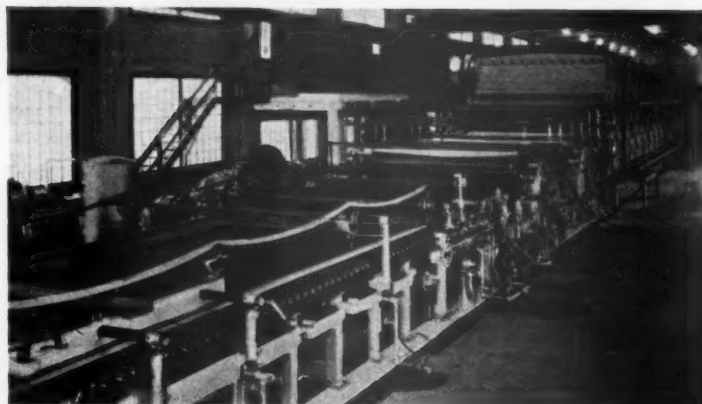
### Vacuum Drying—

By means of the modern vacuum dryer, WEYERHAEUSER HIGH QUALITY PULP is dried at low temperature and the moisture content of the finished sheet is closely controlled automatically. The machine room is air conditioned and of dust-tight construction.

All these factors aid in the production of a pulp of constant dependability.



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